

6. *The Hydrozoa of False Bay, South Africa*. By N. A. H. MILLARD, PH.D., Zoology Department, University of Cape Town. (With fifteen text-figures.)

#### SUMMARY

This paper records a total of sixty-five species of Hydrozoa from False Bay. Of these seven are new records from South Africa, and eight are new species. The latter include *Hydractinia canalifera*, *Eudendrium deciduum*, *Campanularia morgansi*, *Lovenella chiquitita*, *Hebella furax*, *Synthecium hians*, *Sertularella capensis* and *Sertularella falsa*.

#### INTRODUCTION

The literature on South African hydroids is extremely scattered, most of it in reports on expeditions and museum collections in various parts of the world. Of the early authors, only one, Professor E. Warren, was actually living in the country with free access to the shore and the hydroids in their living condition. It is not surprising, therefore, that a very large proportion of the species, and particularly the more inconspicuous ones, should have escaped notice, and that the existing records should be scattered and incomplete.

Of the early workers the main contributors were Busk (1851), Kirchenpauer (1864, 1872, 1876 and 1884), Allman (1876, 1886 and the Challenger Reports of 1883 and 1888), Marktanner-Turneretscher (1890), Warren (1908 and other papers), Jäderholm (1903, 1917 and 1923), Ritchie (1907a and 1909: Scottish National Antarctic Expedition), Vanhöffen (1910: Deutschen Südpolar-Expedition), Broch (1914: Fauna of West Africa), and Stechow (several papers including the reports of the Deutschen Tiefsee-Expedition). In 1925 Stechow published a check-list of the hydroids reported from South Africa up to that date. This included 153 species, of which 56 were collected by the *Valdivia*.

Since that date Manton (1940) has described one new species, Ewer (1953) one, and Millard (1955) three. Vervoort (1946a) has recorded eleven species (none of them new) from the Union.

This paper represents the first of what is hoped to be a comprehensive series describing the hydroids of South Africa. It is proposed for convenience to describe the species of different sections of the coast separately, and False Bay has been chosen as a start because of the very large collection which we possess from that area. The material has accumulated from several different sources.

In the first place there is material collected by the old Government survey vessel, the s.s. *Pieter Faure*, at the beginning of the century. This material was submitted to the author for identification by the South African Museum and is referred to by the reference letters PF. Its preservation is not all that might

be desired, but most of the Calyptoblast species can be identified on their skeletal parts.

Secondly, there is a small amount of material collected by Professor T. A. Stephenson and his colleagues in their ecological survey of the coast, and lodged in the Zoology Department of the University of Cape Town. This was all collected in the littoral area at St. James, and is referred to by the reference letter F.

Lastly, the great bulk of the material was collected during the last ten years by members of the Zoology Department working under Professor J. H. O. Day. The littoral material is referred to by the reference letters CP, and the sublittoral material by the letters FB and FAL. The sublittoral material was collected by dredging and by diving with a frogman's outfit. The latter is entirely the result of the enthusiastic work of Mr. J. C. Morgans, who has been conducting a survey of the bottom fauna, and whose results will be published shortly.

The author is indebted to the members of the Zoology Department for their co-operation and help in collecting specimens, and to the Royal Scottish Museum, Edinburgh, and the Zoologische Sammlung des Bayerischen Staates, Munich, for the loan of valuable type material.

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#### STATION LIST

	DATE	POSITION	DEPTH	BOTTOM
*PF 337	27/9/98	34°13'S/18°33'E	57 m.	Sand
PF 351	28/9/98	34°19'S/18°31'E (off Buffel's Bay)	58-62 m.	
PF 396	6/10/98	Off Buffel's Bay		
PF 405	8/10/98	Off Buffel's Bay		
PF 5013	8/6/00	34°14'S/18°30' E (off Miller's Point)	42 m.	Rock
PF 15608	8/10/02	34°25'S/18°35' E (Rocky Bank)	33 m.	Rock
PF 15675	9/10/02	34°28'S/18°32'E	73 m.	Rock
PF 16287	9/12/02	34°20'S/18°32'E	59 m.	Sand
PF 18232	11/11/03	34°27'S/18°45'E	110 m.	Green mud
PF 18293	7/12/03	34°5'5'S/18°39'E (off Swartklip)	15-18 m.	Rock
CP 15-16	1/5/38	Froggy Pond		
CP 18	30/4/38	Clovelly		
CP 19-20	4/4/38	St. James		
CP 224	29/10/32	St. James		

\* The *Pieter Faure* stations have been converted from the compass bearings given in the records, and are given to the nearest minute.

	DATE	POSITION	DEPTH	BOTTOM
CP 258	-/4/44	St. James		
CP 259	22/3/47	St. James		
CP 324	22/5/48	St. James		
CP 326	30/12/48	Strandfontein		
CP 332	23/8/49	Clovelly		
CP 333-334	25/8/49	Dalebrook		
CP 356	23/2/51	Buffel's Bay		
CP 377, 380	31/3/53	St. James		
CP 392	27/9/54	Oatland Point		
CP 410	28/9/54	Froggy Pond		
CP 415	29/9/54	Froggy Pond		
CP 426	12/10/54	Oatland Point		
FB 101	8/7/46	34°9'S/18°28'E (off Fish Hoek)	22 m.	Sand
FB 102	8/9/46	34°8.5'S/18°27.5'E (off Fish Hoek)	13 m.	?Shell and stones
FB 103	24/11/46	34°8.5'S/18°27.5'E (off Fish Hoek)	15 m.	Shell and sand
FB 104	8/7/46	34°9'S/18°28'E (off Fish Hoek)	22 m.	Sand
FB 105	24/11/46	34°8.5'S/18°27.5'E (off Fish Hoek)	15 m.	Shell and sand
FB 106	8/9/46	34°8.5'S/18°27.5'E (off Fish Hoek)	13 m.	?Shell and stones
FB 107-110	24/11/46	34°8.5'S/18°27.5'E (off Fish Hoek)	15 m.	Shell and sand
FB 111	8/9/46	34°8.5'S/18°27.5'E (off Fish Hoek)	13 m.	?Shell and stones
FB 112	24/11/46	34°8.5'S/18°27.5'E (off Fish Hoek)	15 m.	Shell and sand
FB 113	8/7/46	34°9'S/18°28'E (off Fish Hoek)	22 m.	Sand
FB 114	22/2/47	34°7.5'S/18°31'E (off Muizenberg)	27-28 m.	Rock
FB 115	22/2/47	34°8'S/18°31.5'E (off Muizenberg)	27-28 m.	Sand
FB 116	22/2/47	34°7.7'S/18°31.5'E (off Muizenberg)	23-24 m.	Sand
FB 117	22/2/47	34°7.5'S/18°29.2'E (off Muizenberg)	19-20 m.	Sand
FB 119	21/4/47	34°8.5'S/18°34.5'E (near Seal Is.)	27 m.	Rock
FB 120-121	18/6/47		23-27 m.	Sand and shell
FB 122	28/4/47	34°10'S/18°27.8'E (off Glencairn)	24 m.	Sand
FB 123	28/4/47	34°9.5'S/18°27'E (off Glencairn)	15-19 m.	Sand
FB 126	20/8/47	?Off Strandfontein		
FB 127	26/9/48	34°8'S/18°29.6'E (off Kalk Bay)	18 m.	Sand
FB 128	26/9/48			
FB 129	26/9/48	34°7.1'S/18°29.1'E (off Muizenberg)	19 m.	Rock, shell and sand
FB 130	6/8/47	34°6.9'S/18°30'E (off Muizenberg)	17.5 m.	Sand
FB 131	13/12/49	34°9'S/18°26.7'E (off Glencairn)	5-8 m.	
FB 132	9/3/50	34°8.5'S/18°27'E (off Fish Hoek)	14 m.	Sand
FB 133	18/3/50	34°11'S/18°27.3'E (off Simonstown)	25 m.	Sand
FB 134	5/4/50	34°8.9'S/18°27.4'E (off Glencairn)	15 m.	Sand
FB 136	27/8/51	34°9.6'S/18°26.6'E (off Glencairn)	17 m.	Rock
FB 137	27/8/51	34°10.2'S/18°26.2'E (off Glencairn)	14 m.	Shell and sand
FB 138	27/8/51	34°10.1'S/18°26.1'E (off Glencairn)	9 m.	Sand
FB 139	27/8/51	34°10.0'S/18°26.1'E (off Glencairn)	10 m.	
FB 140	27/8/51	34°9.3'S/18°26.4'E (off Glencairn)	11 m.	Rock

	DATE	POSITION	DEPTH	BOTTOM
FB 141	20/9/50	34°7·5'S/18°29'E (off St. James)	14·5 m.	?Sand and rock
FB 142	20/9/50	34°7·5'S/18°29'E (off St. James)	16·5 m.	Sand and stones
FB 143	27/8/51	Off Glencairn	8 m.	Rock
FB 144	29/4/48	34°10·2'S/18°27·8'E (Roman Rock)	26-29 m.	Sand
FB 145	29/4/48	34°9·2'S/18°26·8'E (off Glencairn)	20-23 m.	Sand and shell
FB 146	26/9/48	34°8·5'S/18°30'E (off Muizenberg)	24 m.	Shell and sand
FB 147	26/9/48	34°7·5'S/18°29·5'E (off Muizenberg)	14 m.	Sand
FAL 6, 7 and 13	22/2/52	34°8·2'S/18°35·3'E (near Seal Is.)	24 m.	Rock
FAL 15	5/3/52	34°12·5'S/18°28'E (SE of Oatland Point)	8-9 m.	Sand and rock
FAL 20, 23	5/3/52	34°13'S/18°28'E (off Spaniard Rock)	11-12 m.	Shell and rock
FAL 26	5/3/52	34°13'S/18°29'E (off Miller's Point)	15-21 m.	?Sand and shell
FAL 34	18/6/52	34°5'S/18°44'E (off Kromhout Rock)	7 m.	Sand and rock
FAL 42	25/6/52	34°9·6'S/18°49·2'E (off Gordon's Bay)	21-22 m.	Sand and rock
FAL 51-52	25/6/52	34°9·3'S/18°49·6'E to 34°9'S/18°50·1'E (off Gordon's Bay)	18 m.	Rock and sand
FAL 56	25/6/52	34°9·4'S/18°50·8'E to 34°9·5'S/18°50·9'E (off Gordon's Bay)	8 m.	Rock
FAL 58	25/6/52	34°9·4'S/18°50·4'E (off Gordon's Bay)	12 m.	Sand and rock
FAL 60	29/7/52	34°17·8'S/18°49·3'E (off Rooi Els)	7-10·5 m.	Sand
FAL 61-62	29/7/52	34°17·5'S/18°49·2'E (off Rooi Els)	22 m.	Sand
FAL 64	29/7/52	34°17·3'S/18°48·7'E (off Rooi Els)	37-38 m.	Shell and ?sand
FAL 66	29/7/52	34°17·2'S/18°49·4'E (north of Rooi Els)	16-19 m.	Rock
FAL 78, 82	19/8/52	34°16·5'S/18°49·5'E (north of Rooi Els)	14-17 m.	Rock
FAL 95	17/9/52	34°10·6'S/18°47·3'E (off Gordon's Bay)	36 m.	Rock and sand
FAL 108	23/1/53	34°9·3'S/18°51'E (Gordon's Bay)	8-12 m.	Rock and sand
FAL 115	12/2/53	34°11'S/18°25·6'E (Simon's Bay)	3-5 m.	Shell and sand
FAL 123	17/2/53	34°10'S/18°26'E (off Glencairn)	7 m.	Rock and sand
FAL 125	17/2/53	34°10'S/18°26'E (off Glencairn)	2-4 m.	Rock
FAL 132	27/2/53	34°12·5'S/18°28'E (Oatland Point)	0-2 m.	Rock
FAL 137	4/3/53	34°9·8'S/18°51·5'E (Gordon's Bay Pier)	0-4 m.	Rock
FAL 141	9/3/53	34°12·5'S/18°28'E (Oatland Point)	0-5 m.	Rock
FAL 148	12/3/53	34°12·5'S/18°28'E (Oatland Point)	5·5-6·5 m.	Stones, rock and sand
FAL 153, 154, 159	21/4/53	34°12·5'S/18°28'E (Oatland Point)	0-3 m.	Rock

	DATE	POSITION	DEPTH	BOTTOM
FAL 160	23/5/53	34°12'5'S/18°28'E (Oatland Point)	0-3 m.	Rock
FAL 165, 167	10/6/53	34°12'5'S/18°28'E (Oatland Point)	2-4 m.	Rock
FAL 169, 174	10/6/53	34°12'5'S/18°28'E (Oatland Point)	4-6.5 m.	Rock
FAL 176	10/6/53	34°12'5'S/18°28'E (Oatland Point)	0-2 m.	Rock
FAL 177	9/8/53	34°12'5'S/18°28'E (Oatland Point)		
FAL 183	11/9/53	34°22'1'S/18°35'2"E (north of Rocky Bank)	73 m.	Shell and sand
FAL 186	10/9/53	34°12'8'S/18°36'5"E	46 m.	Shell and sand
FAL 205	10/9/53	34°17'6'S/18°39'2"E	62 m.	Shell and ?sand
FAL 207	10/9/53	34°9'9'S/18°42'4"E	36.5 m.	Rock and sand
FAL 209	10/9/53	34°6'8'S/18°40'3"E (off Swartklip)	29 m.	Shell and sand
FAL 211	9/9/53	34°7'1'S/18°35'6"E (off Strandfontein)	22 m.	Rock, sand and shell
FAL 214	10/9/53	34°12'4'S/18°43'5"E	42 m.	Rock
FAL 217	9/9/53	34°7'0'S/18°32'5"E (NW of Seal Is.)	18 m.	Rock, sand and shell
FAL 222- 223	9/9/53	34°13'9'S/18°31'6"E (off Miller's Point)	40 m.	Sand and shell
FAL 230	9/9/53	34°17'3'S/18°31'4"E (off Buffel's Bay)	49 m.	
FAL 238	10/9/53	34°20'6'S/18°39'4"E	82 m.	?Shell, sand and green mud
FAL 258	21/11/53	34°12'5'S/18°28'E (Oatland Point)		Shell and sand
FAL 262	21/11/53	34°11'6'S/18°27'3"E (Noah's Ark)	11-14 m.	Rock
FAL 268	18/9/54	34°10'9'S/18°27'2"E (Roman Rock)	15-18 m.	Rock
FAL 274	21/9/54	34°10'9'S/18°27'2"E (Roman Rock)	14-17 m.	Rock
FAL 279, 282	23/9/54	34°10'9'S/18°27'2"E (Roman Rock)	12-14 m.	Rock
FAL 288	15/10/97	34°9'6'S/18°49'8"E (off Gordon's Bay)	18 m.	?Rock
FAL 289- 290	-/9/97		40 m.	
FAL 291	24/3/98			
FAL 292	21/10/03	Kalk Bay		
FAL 311	11/4/55	34°12'5'S/18°28'E (Oatland Point)	0-2 m.	Rock

## LIST OF SPECIES

## GYMNOBLASTEAE

**Corynidae***Coryne* sp.**Tubulariidae***Tubularia solitaria* Warren*Tubularia* sp.**Bougainvilliidae***Hydractinia altispina* Millard*Hydractinia canalifera* n. sp.*Hydractinia carnea* (M. Sars)*Hydractinia* sp.*Leuckartiara octona* (Fleming)*Hydrocorella africana* Stechow**Eudendriidae***Eudendrium ?antarcticum* Stechow*Eudendrium deciduum* n. sp.**Myriothelidae***Myriothela capensis* Manton

## CALYPTOBLASTEAE

**Haleciidae***Hydrodendron caciniiformis* (Ritchie)*Halecium beanii* (Johnston)*Halecium dichotomum* Allman*Halecium parvulum* Bale*Halecium tenellum* Hincks**Campanulariidae***Campanularia integra* MacGillivray*Campanularia morgansi* n. sp.*Clytia gracilis* (M. Sars)*(Clytia raridentata* (Hincks))*Obelia dichotoma* (Linnaeus)*Obelia geniculata* (Linnaeus)**Campanulinidae***Lovenella chiquitita* n. sp.**Lafocidae***Hebella furax* n. sp.*Hebella scandens* (Bale)*Scandia mutabilis* (Ritchie)*Reticularia serpens* (Hassall)*Zygophylax cornucopia* Millard**Syntheciidae***Synthecium ?elegans* Allman*Synthecium hians* n. sp.**Sertulariidae***Dictyocladium coactum* Stechow*Salacia articulata* (Pallas)*Sertularella africana* Stechow*Sertularella abuscula* (Lamouroux)*Sertularella capensis* n. sp.*Sertularella falsa* n. sp.*Sertularella flabellum* (Allman)*Sertularella fusiiformis* (Hincks)*Sertularella goliathus* Stechow*Sertularella mediterranea* Hartlaub*Sertularella megista* Stechow*Sertularella polyzonias* (Linnaeus)*Sertularella xantha* Stechow*Symplectoscyphus macrogonus*

(Trebilcock)

*Amphisbetia bidens* (Bale)*Amphisbetia minima* (Thompson)*Amphisbetia operculata* (Linnaeus)*Sertularia distans* (Lamouroux)*Sertularia marginata* (Kirchenpauer)**Plumulariidae***Antennella africana* Broch*Halopteris constricta* Totton*Halopteris valdiviae* (Stechow)*Paragattya intermedia* Warren*Plumularia lagenifera* Allman*Plumularia pulchella* Bale*Plumularia setacea* (Ellis and Solander)*Plumularia spinulosa* Bale*Kirchenpaueria pinnata* (Linnaeus)*Pycnotheca mirabilis* (Allman)*Nemertesia cymodocea* (Busk)*Nemertesia ramosa* Lamouroux*Antennopsis scotiae* Ritchie*Aglaophenia pluma* (Linnaeus)*Thecocarpus giardi* Billard.*Lytocarpus filamentosus* (Lamarck)

Family **Corynidae***Coryne* sp.

*Records.* FAL 311 T. CP 326 F.

*Description.* Several branching stems reaching 0.8 cm. in length, one with young gonophores, but too small to determine structure. Stem smooth or irregularly corrugated in parts, pedicels of hydranths annulated at base. Hydranths approximately 1 mm. in length.

*Remarks.* There is nothing in the appearance of the colony to exclude it from *Coryne eximia* Allman, but in the absence of mature gonophores the specimens cannot be finally identified.

Family **Tubulariidae***Tubularia solitaria* Warren 1906a.

*Tubularia solitaria* Warren 1906a; p. 83; Pl. X and XI.

*Records.* F 231 (recorded by Eyre 1939). CP 326 D.

*Description.* Gonophores present in December.

*Tubularia* sp.

*Records.* CP 326 E. FAL 153 X.

*Description.* A few small specimens with well-developed perisarc, and hydranths without gonophores.

*Remarks.* Due to the paucity of the material and the absence of gonophores the identification cannot be completed.

Family: **Bougainvilliidae***Hydractinia altispina* Millard 1955

*Hydractinia altispina* Millard 1955; p. 215; fig. 1.

*Records.* F 274. CP 258, 377. FAL 7 Z. (Recorded by Millard 1955.)

*Hydractinia canalifera* n. sp.

## Fig. 1

*Type.* Holotype CP 332 in University of Cape Town.

*Description.* A single colony growing on weed in the littoral area. Hydro-rhiza forming an intimately anastomosing feltwork, encrusted in centre of colony, but not at periphery.

Gastrozooids large, reaching 2–3 mm. in height (preserved), with 10–14 tentacles in a single whorl. Manubrium conical when contracted, but capable of great expansion and even of turning completely inside-out.

No spines. No spiral zooids, but a very few tentacular filaments scattered amongst the gastrozooids.

Gonozooids smaller than gastrozooids, each with a mouth and a single whorl of 6–9 short tentacles, bearing a cluster of 4 or 5 sporosacs on the upper half

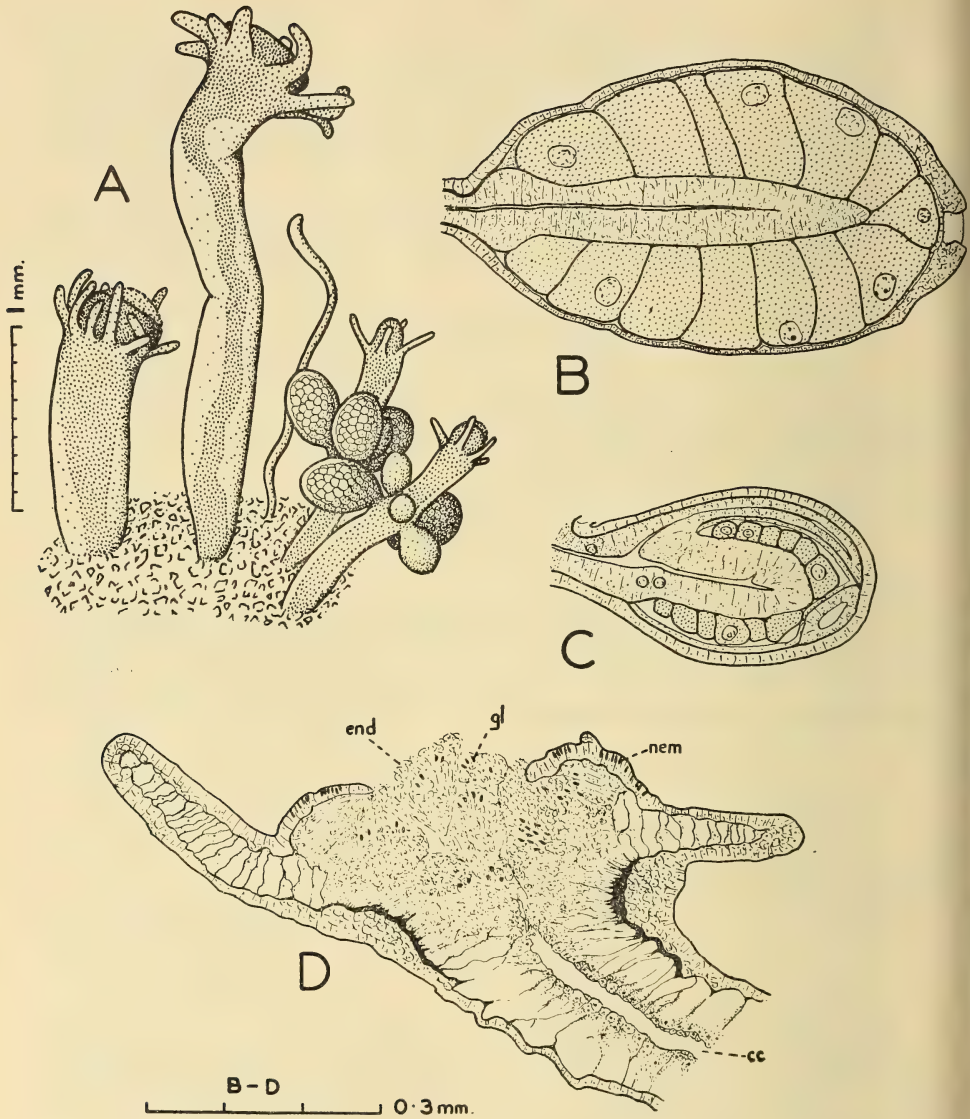


FIG. 1. *Hydractinia canalifera* n. sp. from the holotype.

A. Portion of a colony, showing 2 gastrozooids, a tentacular filament, and 2 female gonozooids bearing sporosacs. B. Longitudinal section through mature female sporosac. Radial canals not visible. C. Longitudinal section through young female sporosac, passing through one radial canal and the central canal. D. Longitudinal section through gastrozooid, showing central canal (cc) of stem, and endodermal plug (end) blocking the mouth. gl, gland cells; nem, nematocysts.



of the stem. Female sporosacs only present, ovoid, containing many eggs (estimated as well over 50). Radial canals and circular canal present in young sporosacs, though not visible in older ones. Manubrium with a very restricted cavity. No vestige of tentacles.

*Detailed Anatomy.* The structure of the zooids is interesting and unusual. Under the dissecting microscope and in whole mounts a distinct central tube can be seen passing up the stem to expand into a mass of solid tissue within the tentacle-ring and completely blocking the mouth. Sections reveal that the narrow central canal is formed by the massing of the cytoplasm in the inner ends of enormously elongated endoderm cells. The outer ends of the cells resting on the mesogloea are swollen and vacuolated, and tend to run together to form a system of open spaces surrounding the central canal.

Near the top of the stem the central canal merges with a solid mass of small endoderm cells which fills all the cavity within the tentacle-ring. Large darkly staining gland cells are visible in the mass. Sometimes a series of crevices puts the central canal or even the outer space into communication with the exterior, but in most cases there is no communication whatever. In a few zooids the central plug of endoderm is actually extruded beyond the level of the manubrium, and in cases where the manubrium has turned inside-out, a large area of endoderm is exposed to the exterior.

*Measurements* (preserved material)

Gastrozooids reaching 3.16 mm. to origin of tentacles. Gonozooids reaching a maximum height of 1.25 mm. to origin of tentacles.

Female sporosac, maximum length	..	..	..	..	0.76 mm.
maximum diameter	..	..	..	..	0.53 mm.

*Remarks.* *H. canalifera* is very close to *H. kaffraria* Millard 1955, but can be distinguished by its larger and more robust zooids, and particularly by the internal modifications of the endoderm.

The only other hydroid known to the author in which the digestive cavity is blocked by endoderm is *Eudendrium angustum* Warren 1908, in which food matter is directly ingested by the endoderm cells. It is probable that a similar method of feeding is employed by *H. canalifera*, and the extrusion of the endoderm and eversion of the manubrium suggests that secretions may also be poured over the food outside the body.

*Hydractinia carnea* (M. Sars) 1846

*Podocoryne carnea* Hincks 1868; p. 29; Pl. V.

?*Hydractinia parvispina* Vanhöffen 1910, p. 291.

*Hydractinia carnea* Vervoort 1946, p. 126, fig. 49.

*Records.* FB 108, 121 B. FAL 64 W, 205 C, 209 D, 238 B.

*Description.* Colonies fairly common in dredgings on shells of *Hinia speciosa* (Adams). Hydrorhiza an open meshwork in younger parts of colony, completely encrusted in older parts, spines present only in fully encrusted areas.

Ripe gonophores, however, may be present in areas which are not fully encrusted.

The development of the medusoid individuals at the time of liberation varies considerably and does not seem to depend on the season. I have seen a gonozoid bearing two gonophores, one of which was a small but perfectly developed medusa with 4 tentacles and no sexual products, and the other much larger and filled with spermatogenic cells, yet with the tentacles undeveloped. Female medusoids are often packed with eggs at the time of liberation, the number varying from 27 to 40. Gonophores present in June, July, September and November.

*Remarks.* It is highly probable that the material reported from Simonstown as *H. parvispina* on *Nassa* by Vanhöffen is the same species with precociously developed sexual products.

*Hydractinia* sp.

*Records.* FAL 183 N.

*Description.* Hydrorhiza encrusted. Spines smooth, long and hollow, reaching a maximum length of 1.5 mm. Gastrozoid about 4 mm. long. Gonozooids smaller, tentacular. Gonophores in the form of fixed sporosacs, no radial canals visible. Smaller ones female, containing tightly packed eggs. Larger ones male or hermaphrodite, the latter containing a few scattered eggs-packed amongst masses of spermatogenic material.

*Remarks.* The material is in a very poor state of preservation, and the nature of the gastrozooids and gonozooids cannot be determined. The species appears to be closely related to *Hydractinia altispina* Millard 1955, although hydranths and spines are somewhat longer. The sporosacs are better preserved than the hydranths, and appear to be unique in their hermaphroditic nature.

*Leuckartiara octona* (Fleming) 1823

*Eudendrium repens* Wright 1858.

*Leuckartiara octona* Rees 1938, p. 12 (synonymy), figs. 3-5.

*Records.* FB 121 C, 136 C, 138 A, all on *Bullia annulata* (Lamarck). FAL 60 C, 61 B, 115 E, 209 C, on *Bullia annulata* (Lamarck); FAL 238 C on *Nassarius circumtectus*.

*Description.* Colonies fairly common on the shells of certain gastropods. The form of the colony is very similar to that described by Rees 1938 from the shell of a *Turritella* inhabited by a hermit crab.

On the 'under' side of the shell the stems are low and the hydranths small, the whole colony not exceeding 1 mm. in height. No gonophores are present in this region and often no hydranths, the shell being covered only by the reticular hydrorhiza.

On the 'upper' side of the shell and round the tip of the spire the colony is much better developed and reaches a height of 3-5 mm. The stems are long

and occasionally branched, and bear numerous gonophores. Only once was a gonophore seen to arise from the hydrorhiza.

Perisarc annulated or coarsely wrinkled at base of stem, widening distally and continued over hydranth to bases of tentacles where it ends abruptly. Hydranths with 6-12 tentacles, usually held alternately elevated and depressed.

Gonophores with short annulated pedicels, completely invested by transparent perisarc. Medusae with 2 long tentacles when ready to leave. Gonophores present from June to September.

*Measurements* (in mm., preserved material)

Hydrorhiza, diameter	..	..	..	..	..	0.04-0.07
Stem, diameter at base	..	..	..	..	..	0.045-0.07
Pseudohydrotheca, length	..	..	..	..	..	0.22-0.37
maximum diameter	..	..	..	..	..	0.19-0.38
Hydranth, length to tip of manubrium	..	..	..	..	..	0.30-0.51
Gonophore, length	..	..	..	..	..	0.30-0.60
diameter	..	..	..	..	..	0.18-0.45

*Hydrocorella africana* Stechow 1921c

*Hydrocorella africana* Stechow 1925, p. 409.

*Records.* FB 114 B, 115 C, 122 B, 123 B, 125 B, 136 D, 137 B, 143 A, 144, 145.

*Description.* Fertile colonies growing on empty gastropod shells. Gonophores borne in clusters on gonozooids which are smaller than the gastrozooids and possess about 6 rudimentary tentacles. Gonophores present in February.

Family: **Eudendriidae**

*Eudendrium ?antarcticum* Stechow 1921a

*Eudendrium antarcticum* Stechow 1925, p. 415, fig. 5.

*Records.* FAL 288 H.

*Description.* Hydrorhiza creeping on other hydroids. Stem unbranched or sparingly branched, reaching a maximum height of 3 mm.; annulated at base, on origins of branches and occasionally for short distances in other regions. Perisarc terminating abruptly below hydranth. Hydranth with about 20 tentacles (19-23 in 8 counts) and a distinct annular groove near base.

Male gonophores borne in clusters on completely atrophied hydranths which arise from the stem or, more frequently, direct from the hydrorhiza. Pedicel annulated. Gonophore one-chambered, with a distinct tubercle at distal end. Present in October. Female gonophores absent.

*Measurements* (in mm., preserved)

Stem, diameter	..	..	..	..	..	0.055-0.075
Hydranth, length to tip of manubrium	..	..	..	..	..	0.20-0.30
diameter at tentacle roots	..	..	..	..	..	0.11-0.16
Gonophores, male, length	..	..	..	..	..	0.15-0.22

*Remarks.* This species cannot be definitely diagnosed in the absence of female gonophores. The trophosome and its measurements, however, agree well with Stechow's description.

The species is excluded from *E. parvum* Warren and *E. capillare* Alder by the smaller diameter of the stem and the one-chambered male gonophores. It is close to *E. simplex* Pieper 1884, which, however, is said to have hermaphroditic gonophores.

Totton, 1930, gave the name *E. antarcticum* to a group of small antarctic forms which had previously been assigned to several different species. Totton's species differs from that of Stechow in its taller growth (reaching 6 cm.), in the presence of a weakly fascicled stem in the larger specimens, and particularly in the greater diameter of the stem. It is obviously a separate species, and was renamed *E. tottoni* by Stechow in 1932.

*Eudendrium deciduum* n. sp.

Fig. 2

*Types and Records.* Holotype FAL 52 V in University of Cape Town. Further records: PF ?351 D, ?18232 A. FAL 13 E, 82 W, 108 N, 154 A, 169 S, 183 K, 288 G.

*Description.* Rugged tree-like colonies reaching a maximum height of 16 cm. Main stem thick and woody at base, reaching a diameter of 8 mm. Main stem and principle branches fascicled. Branching irregular and in all planes, hydranth-bearing pedicels with a tendency to arise from one side of branches. Annulations present on origins of all branches and pedicels, and groups of annulations at irregular intervals on stem and branches, pedicels annulated to a varying extent but generally smooth in terminal portion, gonophore-bearing pedicels more or less completely annulated. Perisarc terminating abruptly below hydranths, hydranth with basal circular groove and about 26 tentacles (22-30 in 23 counts).

Male gonophores 2-3 chambered, on atrophied hydranth. Female gonophores borne in whorl at base of hydranth, which later atrophies; spadix branching and later shed.

The material shows all stages in the development of the female gonophores (fig. 2, E-H). In the earliest stage the spadix curves round the egg as in the typical gonophores of *E. ramosum*, later it develops 3 to 4 pairs of lateral projections, and eventually the whole spadix peels away from the embryo and is discarded. At about this stage, too, the tentacles of the gonophore-bearing hydranth atrophy. The young embryo remains enclosed in a transparent capsule which typically bears warty protuberances on the surface.

*Remarks.* This species is almost impossible to distinguish from several others in the absence of gonophores. It is closely related to *E. ramosum* (Linn.) and *E. rameum* (Pallas), neither of which, however, has been recorded from South Africa. It is also close to *E. angustum* Warren, which was recorded off Algoa Bay at 40 fath., but differs from it in the presence of a groove round the base

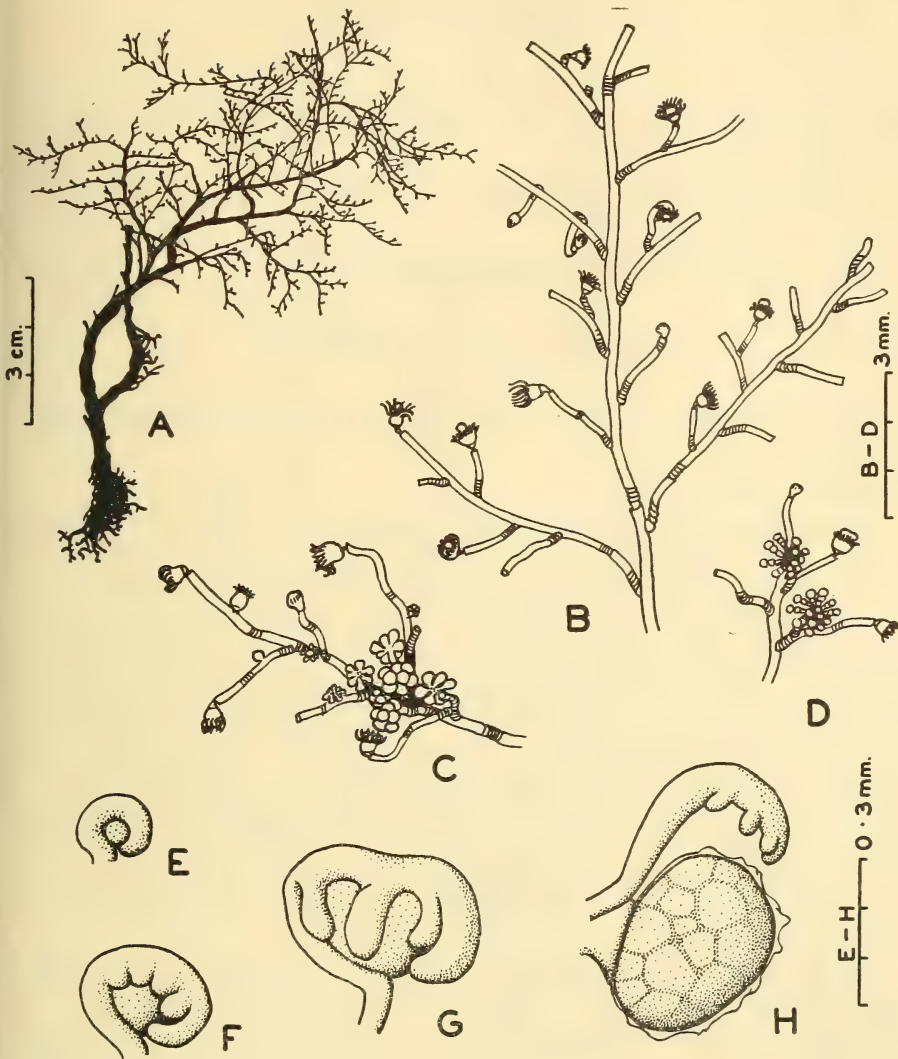


FIG. 2. *Eudendrium deciduum* n. sp. from the holotype.

A. Whole colony. B. Portion of sterile colony. C. Branch bearing female gonophores in various stages of development. D. A branch bearing two groups of male gonophores. E-H. Stages in development of the female gonophore (see text).

of the hydranth, and in the absence of an endodermal plug in the gastral cavity. *E. racemosum* (Gmelin) differs in the form of the female gonophore, which has a forked spadix.

Gonophores of *E. deciduum* have been observed in April, June and October. The main stem of the colony is dark brown, the smaller branches clear brown to horn-colour, and the female gonophores bright orange when living.

Family: **Myriothelidae***Myriothela capensis* Manton 1940

*Myriothela capensis* Manton 1940, p. 276, figs. 7, 8b, 9, Pl. I, figs. 12, 13.

*Records.* FB 119 G.

*Description.* A single small specimen measuring 0.65 cm. (preserved), with gonophores containing eggs.

Family: **Haleciidae***Hydrodendron caciniiformis* (Ritchie) 1907

Fig. 3

*Ophiodes caciniiformis* Ritchie 1907, p. 500; Pl. XXIII, figs. 11 and 12; Pl. XXIV, fig. 1.

*Records.* FAL 268 J.

*Description.* A small colony growing on weed and reaching a maximum height of 9.5 mm. Hydrorhiza forming a loose network on surface and strengthened by internal chitinous projections; giving rise to upright stems, solitary hydrophores, and a few scattered nematophores.

Stem sometimes weakly fascicled at base and occasionally branched, divided into fairly regular internodes which bear the hydrophores alternately to right and left, each on a short apophysis near the distal end. A suggestion of an annulation above and below each node. Branches, when present, exactly similar to main stem. Ritchie states that 'a secondary hydrotheca, borne on a relatively long peduncle, may arise from the lower portion of the peduncle of a primary hydrotheca'. This occurs quite commonly in the False Bay material, and a branch is simply the continuation of this process of budding. The two rows of hydrophores are not always in the same plane, but sometimes converge slightly to one side.

Hydrophores elongated, flaring towards margin, which is everted, separated from stem apophysis by one or more nodes. No reduplications observed. An indication of a pseudodiaphragm sometimes evident near base of hydrophore as an annular thickening of the perisarc. Hydrotheca with a well-defined diaphragm at base, and a row of puncta about one third of the height above it. Polyps not well preserved, but apparently can be almost retracted into hydrothecae.

Nematothecae irregular and scarce, about 4 or 5 to a stem; borne on stem internodes, bases of hydrophores, or from hydrorhiza; sessile, goblet-shaped, with everted margin. No refringent dots observed.

Gonangia absent.

*Measurements* (mm.)

Stem, diameter at node	..	..	..	..	..	0.12-0.16
length of internode	..	..	..	..	..	0.33-0.54

Hydrophore, margin to stem apophysis (unbranched examples only) .. .. .	0.26-0.58
margin to diaphragm .. .. .	0.085-0.12
margin to puncta .. .. .	0.06-0.08
diameter at margin .. .. .	0.21-0.24
Nematophore, length .. .. .	0.15-0.20
diameter at margin .. .. .	0.10-0.12

*Remarks.* This comparatively rare species has been reported from the Cape Verde Islands, the West Indies and the Mediterranean. This is the first record from South Africa.

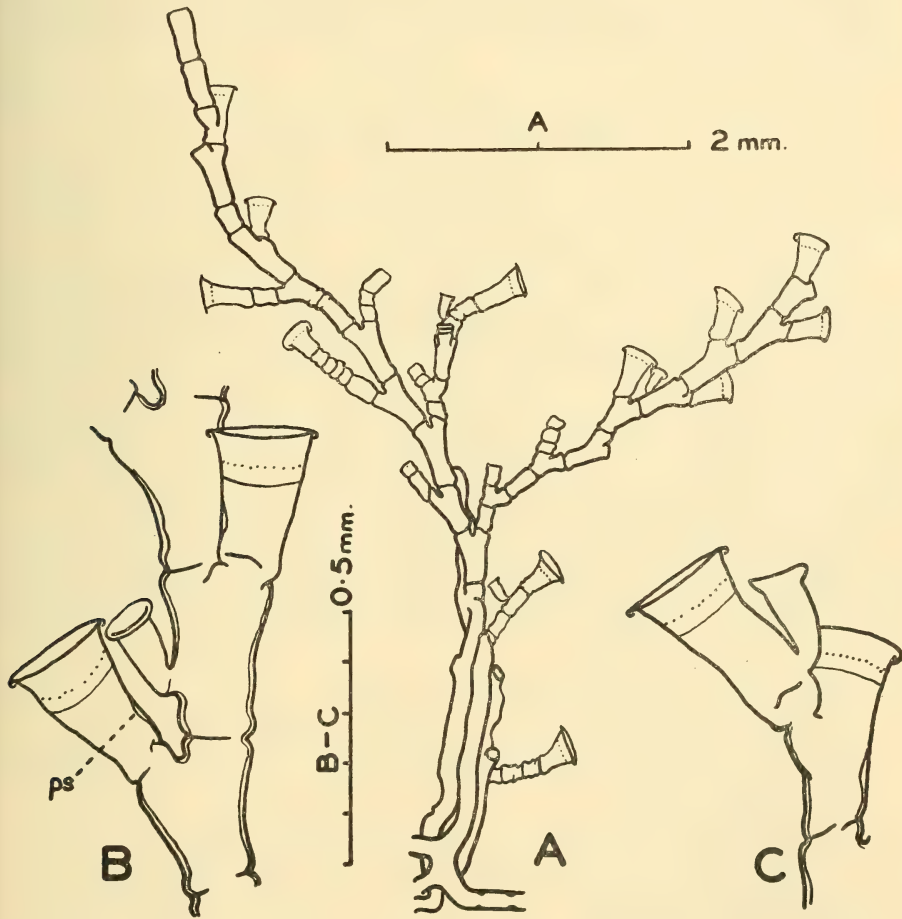


FIG. 3. *Hydrodendron caciniiformis* (Ritchie). FAL 268 J.

A. A complete upright stem. B and C. Enlarged portions showing hydrophores and nematocysts. In C a secondary hydrophore is branching from a primary one. *ps*, pseudodiaphragm.

*Halecium beanii* (Johnston) 1838

*Halecium Beanii* Hincks 1868, p. 224; Pl. XLIII, fig. 2. Broch 1918, p. 38, fig. XIII.

*Halecium beani* Stechow 1925, p. 419.

*Records.* CP 356 H. FB 119 F. FAL 66 S, 78 Y, 153 Z, 183 L, 186 E, 282 Y, 288 B, 311 V.

*Description.* There is little further to add to the description of this well-known species. Abundant material with male and female gonangia has been collected from various localities. Colonies are generally short and bushy, reaching a maximum height of 5.0 cm. The primary hydrothecae are sessile and adnate to the stem, and often the two rows are not quite in the same plane but inclined to one side. Ripe gonangia have been found in April and from August to October.

*Halecium dichotomum* Allman 1888

*Halecium dichotomum* Allman 1888, p. 13; Pl. VI. Stechow 1925, p. 419.

*Records.* PF 15608 J. FAL 78 Z, ?64 N.

*Description.* Colonies short and scrubby with strongly fascicled stems, and hydrophores shorter and more annulated than those figured by Allman. Hydrothecal walls straight for the major part, with the extreme edge bent sharply outward.

Female gonangia of the typical annulated type, and male gonangia (not previously described) present on the same colonies. The latter smaller than the female, elongated, slender, smooth, but often with several longitudinal creases near distal end. Gonangia present in August and October.

Some of the material (FAL 64 N) is assigned with some doubt to this species. The form of the colony and structure of the hydrophores is indistinguishable, but the female gonangia, although annulated in the typical manner, show no trace of a lateral opening.

*Measurements* (in mm., excluding FAL 64 N)

Hydrophore, length from origin on previous hydrophore	0.34-0.95
Hydrotheca, length, diaphragm to margin	0.03-0.045
puncta to margin	0.02-0.03
diameter at margin	0.19-0.23
diameter at level of diaphragm	0.16-0.20
Gonotheca, female, length	1.03-1.25
maximum diameter	0.46-0.50
Gonotheca, male, length	0.52-0.73
maximum diameter	0.15-0.19





*Remarks.* *H. gracile* Bale 1888 and *H. parvulum* Bale 1888 are accepted as synonyms, but since *H. gracile* is preoccupied by *H. gracile* Verrill 1874, the name *H. parvulum* must be used. There seems to be some doubt as to whether Bale's species is synonymous with *H. flexile* Allman 1888, the synonymy being accepted by Hartlaub 1905, Ritchie 1911, Bale 1915 and Stechow 1919; and rejected by Totton 1930. Female gonophores of *H. flexile* have not been described, and so in the meantime it seems better to keep the two species apart.

The measurements of the False Bay material agree well with those given by Billard 1906b, and with the size of *H. gracile* and *H. parvulum* in Bale's illustrations, except that the female gonothecae of Bale's specimens are somewhat smaller.

*H. parvulum* occurs in Australia, South America and Morocco, but this is the first record from South Africa.

var. *magnum*, n. var.

Fig. 4, B-O

*Types and Records.* Holotype FAL 274 R in University of Cape Town, male and female. Paratypes FAL 159 L in University of Cape Town, PF 405 A and PF 16287 A, part in University of Cape Town and part in S.A. Museum. Further records: FAL 82 V, 214 H, 268 H, 288 C.

*Description.* Stiff bushy colonies, differing from the typical form only in the much larger dimensions. The stem internodes, the hydrothecae and the female gonothecae are approximately double those of the typical form, and the two varieties can be distinguished at a glance.

<i>Measurements</i> (mm.)	<i>Holotype</i>	<i>Paratypes</i>
Stem, diameter .. .. .	0.23-0.31	0.21-0.33
length of internode .. .. .	0.82-1.10	0.61-1.34
Hydrophore (primary only), length from origin		
on internode .. .. .	0.10-0.37	0.15-0.35
Hydrotheca, length, puncta to margin .. .. .	0.04-0.07	0.04-0.07
diameter at margin .. .. .	0.33-0.37	0.26-0.36
Gonotheca, female, maximum length .. .. .	2.28	3.05
maximum width .. .. .	2.05	2.38
Gonotheca, male, maximum length .. .. .	0.99	1.31
maximum width .. .. .	0.67	0.79

*Remarks.* The maximum height of the holotype material is 6.4 cm., but paratypes PF 405 A and 16287 A are both very much more luxurious, the latter reaching 17.3 cm. Gonangia have been recorded in September, October and December.

From the abundant fruiting material collected it has been possible to follow the development of the gonangia, which has not previously been described for this species. The development is interesting since the gonothecae differ in

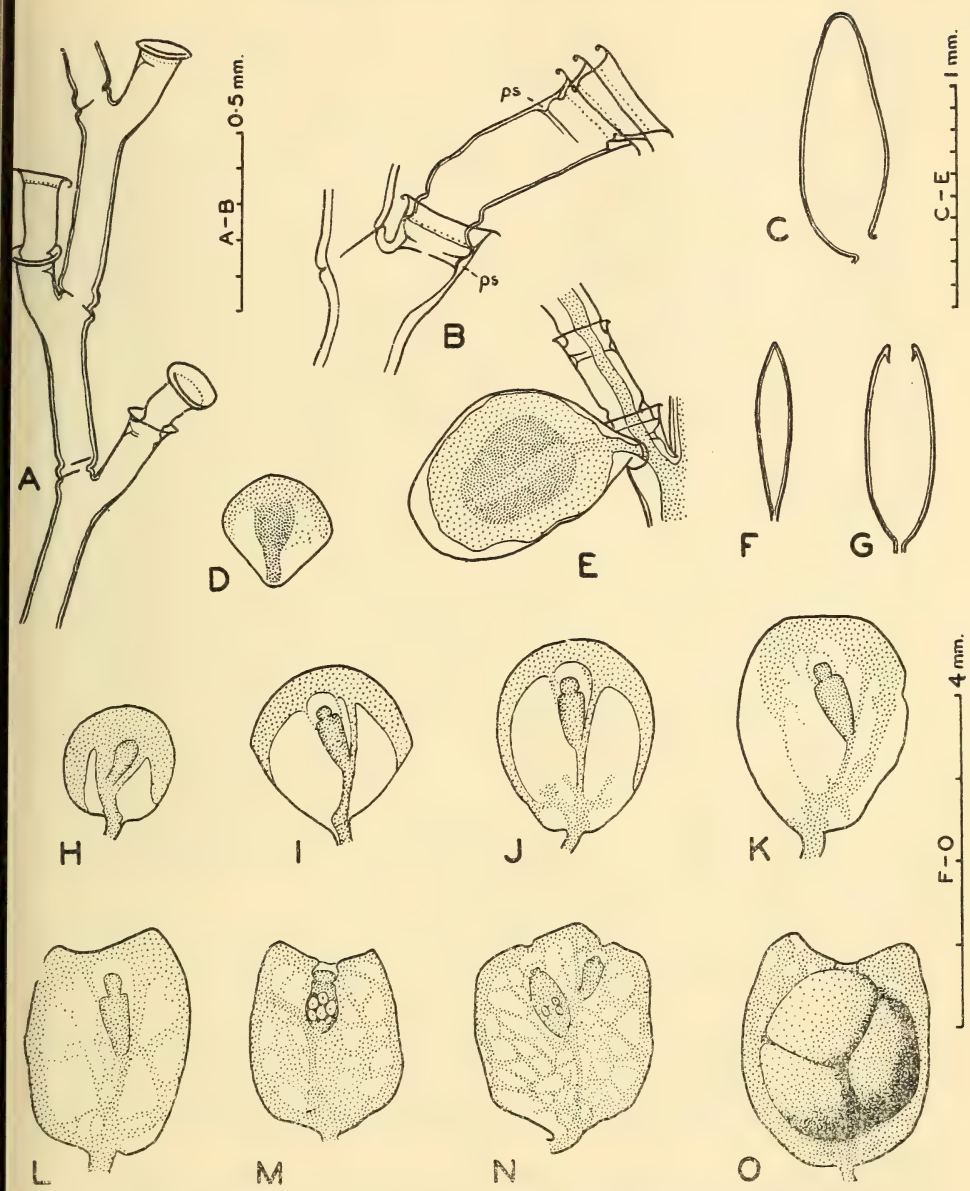


FIG. 4. A. *Halecium parvulum* Bale, typical form.

B-O. *Halecium parvulum* Bale, var. *magnum* n. var.

B. A single hydrophore from the holotype, on same scale as A. C-E. Male gonangia from the paratype PF 405 A; C is a mature gonotheca in longitudinal section; D a young gonangium, and E a mature gonangium, both in front view. F-O. Female gonangia; F a young gonotheca and G a mature gonotheca in longitudinal section; H-O successive developmental stages in front view. N is an abnormal gonangium with two hydranths. F-M from the holotype, N and O from the paratype FAL 159 L. *ps*, pseudodaphragm,

appearance at different stages in their development, and were it not that all stages have been observed on one colony, they might have been assigned to different species. The following description is based primarily on the holotype, but is supplemented and confirmed by the paratypes.

The youngest female gonotheca observed is disc-shaped, with a sharp edge and slightly bulging centre, and a diameter of about 1.4 mm. (fig. 4, F and H). Within it is a blastostyle which expands into a sickle-shaped cap at the distal end. Below the cap the blastostyle gives rise on one side to a bud resembling a hydranth, but without tentacles. At a later stage (fig. 4, I), when the bud is larger, the resemblance to a hydranth is even more striking—the rounded distal end, or manubrium, is contained in a transparent capsule, and is separated from the broad proximal region by a deep constriction. In stained preparations ectoderm and endoderm layers are clearly visible, the manubrium is solid and has no mouth, but the body has a capacious gastral cavity. Later (fig. 4, J), the blastostyle gives off a number of branching processes from the base. These apparently grow outwards until they fuse with the distal cap and partly obscure the hydranth in a netlike ramification. When the width has reached about 2 mm. the shape of the gonotheca has changed. The distal end expands into two earlike outgrowths, between which the edge is thick and truncated. In the centre of this blunt edge is a circular opening around which the margin is inturned to form a delicate internal collar (fig. 4, G, L–O). Hence the notched appearance characteristic of the species. The flattened manubrium of the hydranth now plugs the opening, and a number of eggs are visible on the body. After this the whole structure becomes very thick and dense due to further growth of the network of the blastostyle, and within it 3 or 4 eggs enlarge to form bulky larvae eventually filling the gonotheca (fig. 4, O). Occasionally abnormal gonothecae occur, containing two hydranths and possessing two openings (fig. 4, N).

The development of the gonangia in the typical form of *H. parvulum* is probably identical, but so far well-preserved material of the younger stages is lacking.

The relationship of this species to others, such as the well-known *H. beanii*, where fully formed hydranths arise from the blastostyle, is easily apparent. The sexual products in both cases are borne on a modified hydranth, which in *H. parvulum* is without mouth or tentacles, and entirely contained in the gonotheca.

The male gonangia start their development in very much the same way as the female (fig. 4, C–E). The young gonotheca is almost circular and flattened, with sharp edges. The blastostyle grows through the centre to expand into a sickle-shaped cap at the distal end. In this case, however, it forms no hydranth, but bears the sexual products directly on its proximal part. Mature gonothecae are oval rather than circular, and the edges more blunt. They presumably burst to set free the spermatozoa.

*Halecium tenellum* Hincks 1861

Fig. 5

*Halecium tenellum* Hincks 1868, p. 226; Pl. XLV, fig. 1. Ritchie 1907a, p. 525; Pl. II, fig. 4. Broch 1918, p. 46, fig. 20. Stechow 1919a, p. 41, figs. J-K; 1925, p. 418.

*Records.* FAL 290 C.

*Description.* Delicate monosiphonic colonies growing on other hydroids and reaching 4 mm. in height. Stems annulated above and below nodes, otherwise smooth. Stem internodes very irregular in length and often devoid of hydrophores—the proximal part of the stem may bear as many as 7 athecate internodes before the typical sympodial branching commences. Branches often arising in pairs, giving a dichotomous appearance. Secondary hydrophores annulated at base, margin everted. Gonangia (probably male) flattened in plane at right angles to stem, oval to circular in front view (very similar to those figured by Broch), borne on short stalk, which may be segmented, from stem or hydrorhiza.

*Measurements* (mm.)

Stem, diameter	..	..	..	..	..	0·04–0·07
length of internode	..	..	..	..	..	0·09–0·38
Hydrotheca, length, diaphragm to margin	..	..	..	..	..	0·03–0·04
length, puncta to margin	..	..	..	..	..	0·02–0·035
diameter at margin	..	..	..	..	..	0·12–0·17
Gonotheca, length, maximum	..	..	..	..	..	0·71
width, maximum	..	..	..	..	..	0·38

Family: **Campanulariidae***Campanularia integra* MacGillivray 1842

*Campanularia caliculata* Warren 1908, p. 338, fig. 19.

*Campanularia integra* Broch 1918, p. 159 (synonymy).

*Records.* F 267. CP 259. FB 101, 102, 103, 113 (growing on crab *Dehaaninus dentatus* (M. Edw.)), 123, 131 G, 134 B, 137 A, 138 B, 140 C. FAL 174 Z, 258 F.

*Description.* Colonies abundant on weed in littoral area and shallow water of certain regions. Pedicels annulated, but last segment much more definite than the rest. Hydrothecae variable in size, shape and thickness of perisarc.

Gonangia with smooth or faintly annulated walls, flattened from side to side and elongate-oval in cross-section. Pedicel short and smooth. Containing 1–3 gonophores which bear eggs in the female. The gonophores sometimes resemble degenerate medusae with 4 minute tentacles. Present in March, and July to September.

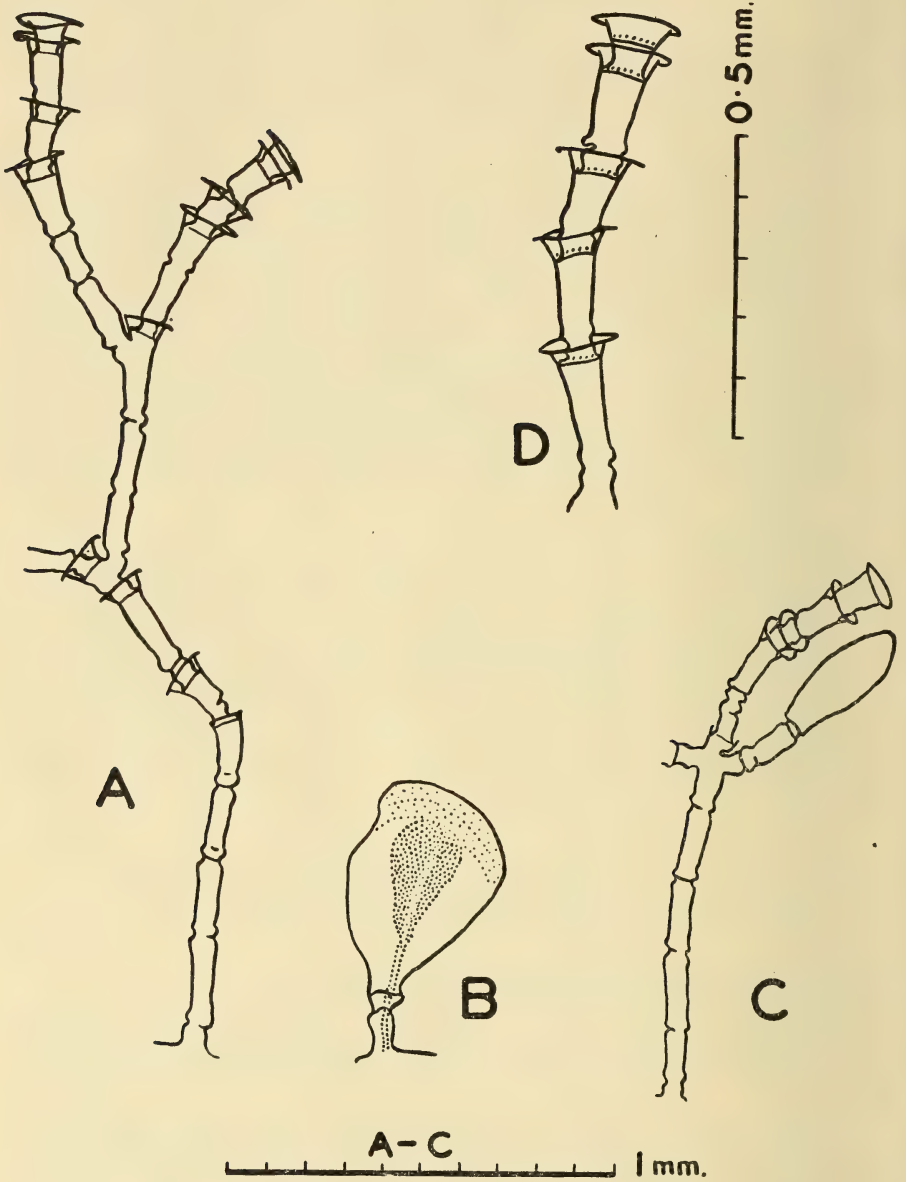


FIG. 5. *Halecium tenellum* Hincks. FAL 290 C.

A gonangium (male?) is shown in front view arising from the hydrorhiza in B, and in side view arising from the stem in C.

*Campanularia morgansi* n. sp.

## Fig. 6

*Types and Records.* Holotype PF 15675 B in University of Cape Town. Paratypes PF 351 C, FB 119 L, and FAL 26 L in University of Cape Town; PF 18232 B in S.A. Museum. Further records: FAL 289 B.

*Description.* Colony stolonial, creeping on other hydroids. Pedicels of hydrothecae unbranched, arising direct from hydrorhiza, not distinctly annulated but corrugated, with one distinct, somewhat flattened segment below hydrotheca in which diameter is usually less than that of pedicel.

Hydrotheca long and narrow, tapering at base, not widening markedly to margin, but with a raised and sometimes strongly thickened rim just below margin. Marginal teeth 10 to 13 in number (although one specimen with 9

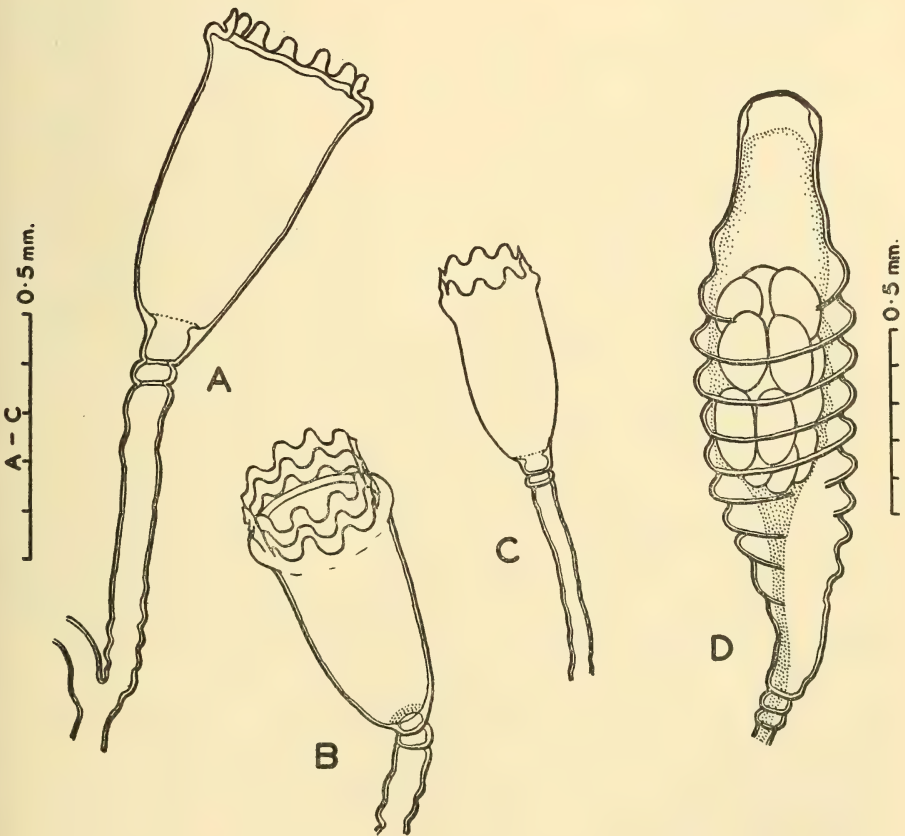


FIG. 6. *Campanularia morgansi* n. sp. from the holotype.

A-C. Three hydrothecae drawn to same scale. Reduplications shown in B. D. A female gonotheca.

teeth observed among paratypes), sharply pointed to bluntly rounded, separated by rounded bays. Hydrotheca not striated, and margin smooth and quite round when seen end-on. No diaphragm, but an annular thickening near base of hydrotheca, and a row of refringent dots just above it. Reduplications may occur, involving both the margin and the row of refringent dots. Hydranth with about 16 tentacles and rounded manubrium.

Gonothecae borne direct from hydrotheca on short annulated pedicels (2-6 annulations), slender and elongated, deeply annulated (5-9 annulations) for over  $\frac{3}{4}$  length, and terminating in a smooth narrowed neck. Margin inturned, smooth and slightly thickened, with a convex operculum. Containing numerous eggs or planulae larvae attached to a central blastostyle. The holotype has only female gonothecae, but one of the paratypes has 2 male gonothecae, which are similar in shape to the female, but slightly smaller.

Measurements (mm.)	Holotype	Paratypes
Pedicel, length .. .. .	0.49-1.15	0.26-2.22
maximum diameter .. .. .	0.05-0.10	0.05-0.08
Hydrotheca, length .. .. .	0.46-0.72	0.43-0.71
maximum diameter .. .. .	0.21-0.37	0.21-0.27
length/diameter .. .. .	1.76-2.32	1.77-3.00
Gonotheca, female, length .. .. .	0.84-1.72	
maximum diameter .. .. .	0.33-0.50	
Gonotheca, male, length .. .. .		0.77
maximum diameter .. .. .		0.26

*Remarks.* This species is named after J. C. Morgans who collected the first material examined off Miller's Point. Later, material rich in gonophores was found among the *Pieter Faure* collection and was chosen as the holotype. Gonophores have been recorded from September to November.

The species is close to *Campanularia africana* Stechow 1923b, which, however, lacks the raised rim below the hydrothecal margin, and has smooth gonothecae.

The general shape of the hydrotheca is similar to a number of other Campanulariidae, including *Campanularia hicksoni* Totton 1930, *Clytia ulvae* Stechow 1919a, and *Eucalyx paradoxus* Stechow 1923b. It is excluded from *Clytia* and *Eucalyx* by the absence of a diaphragm, whereas *Campanularia hicksoni* has a striated hydrotheca and a smooth gonotheca.

#### *Clytia gracilis* (M. Sars) 1851

*Gonothyraea gracilis* Hincks 1868, p. 183; Pl. XXXVI, fig. 1.

(?) *Gonothyraea gracilis* Hartlaub 1905, p. 583, figs. F<sup>2</sup>-J<sup>2</sup>.

*Laomedea gracilis* Broch 1918, p. 170.

*Clytia gracilis* Stechow 1925, p. 431, figs. 9-10.

*Records.* PF 15608 K. FB 119 M, 131 F. FAL 23 Q, 26 L, 66 Q, 82 Y, 279 H, 288 D, 290 D.



*Description.* Stem unbranched or sparingly branched, reaching a maximum height of 0.6 cm., usually annulated at top and bottom only, but occasionally throughout.

Hydrothecae extremely variable in size, shape and number of teeth. Shape inversely conical, or with almost parallel sides. Marginal teeth sharp or acutely rounded, with rounded bays between them, 8–15 in number. Margin undulating when seen end-on, but not sufficiently so to show striations in side view, except near the edges.

Gonotheca with truncated top and constriction just below the rim. Containing up to 4 medusa-buds, each with 4 well-developed tentacles when mature. Present in March, July, August, October and December.

*Measurements* (mm.)

Pedicle, length	..	..	..	..	..	0.66–5.72
maximum diameter	..	..	..	..	..	0.05–0.11
Hydrotheca, length	..	..	..	..	..	0.39–0.89
maximum diameter	..	..	..	..	..	0.18–0.61
length/diameter	..	..	..	..	..	1.28–2.89
Gonotheca, length	..	..	..	..	..	0.56–1.07
maximum diameter	..	..	..	..	..	0.25–0.41

*Remarks.* From the preliminary sorting of material this species appears to be common all round the South African coast from Table Bay to Natal. In spite of the variable nature of the hydrotheca it is easily recognized by its gonotheca.

Stechow 1925 has reported divided marginal teeth in material from Cape Agulhas. Possibly he is mistaken over this point, for due to the extreme delicacy of the hydrothecae the impression of divided teeth is often obtained in microscopic preparations when the teeth of one side are superimposed on those of the other, especially since the teeth sometimes lean slightly to one side.

*Clytia raridentata* (Hincks) 1861

*Campanularia* ?*raridentata* Hincks 1868, p. 176; Pl. XXVI, fig. 2.

*Clytia raridentata* Vanhöffen 1910, p. 301, fig. 22.

*Thaumantias raridentata* Stechow 1925, p. 426.

*Remarks.* The previous records of this species from South Africa should be regarded with caution, as none had gonophores. Vanhöffen's material from Simonstown might well be *Clytia gracilis*, which is common in False Bay, and which often has as few as 8 marginal teeth. The same might apply to Stechow's material which was not illustrated.

Further, there is some confusion over the appearance of the gonophore of *C. raridentata*, Fraser 1944 describing a smooth gonotheca from North America similar in shape to *C. gracilis*, and Stechow 1923c describing an annulated one from the Mediterranean. It is possible that two species are involved: Fraser may have been dealing with *C. gracilis*.

*Obelia dichotoma* (Linn.) 1758

*Obelia dichotoma* Hincks 1868, p. 156; Pl. XXVIII, fig. 1.

*Laomedea dichotoma* Vervoort 1946, p. 292, fig. 128; 1946b, p. 344.

*Records.* CP 16. FB 106, 119 K, 120 B. FAL 23 N, 34 B, 78 X, 108 P, 123 M, 125 S, 148 H, 160 X, 165 X, 169 Z, 279 J.

*Description.* Colonies usually less than 2 cm. in height and scantily branched, but sometimes reaching 2.9 cm. and more profusely branched in the typical pseudo-dichotomous manner. Stem straight, or slightly geniculate, due to curvature within the internodes rather than bending at the nodes.

Hydrotheca margin very delicate and almost invariably damaged or worn. Only rarely can the typical marginal indentations be distinguished. No longitudinal striations. Diaphragm straight or slightly oblique.

Gonangia borne profusely on stem or hydrorhiza. Medusae with 16 tentacles at time of liberation. Gonangia observed in January to March, May, June and August.

*Obelia geniculata* (Linn.) 1758

*Obelia geniculata* Hincks 1868, p. 149; Pl. XXV, fig. 1.

*Records.* CP 356 C.

*Description.* A single colony with gonangia reaching a maximum height of 0.7 cm.

*Remarks.* The colony approaches var. *subsessilis* Jäderholm 1904, but since the internodes of a stem may vary from this form (short and thick, giving rise to pedicels with only one annulation) to the typical form (elongated, giving rise to pedicels with several annulations), no distinct varieties have been distinguished.

Family: **Campanulinidae***Lovenella chiquitita* n. sp.

## Fig. 7

*Types.* Holotype FAL 288 J, epizootic on *Eudendrium deciduum* n. sp., in University of Cape Town. Paratypes FB 131 F, epizootic on *Sertularella falsa* n. sp., and FAL 108 O, growing on weed, in University of Cape Town.

*Description.* Hydrorhiza creeping on weeds or other hydroids, smooth, reticulate. Hydrothecae borne on pedicels which arise direct from hydrorhiza, or from a stem which is sparingly branched in a sympodial manner. Maximum height of colony 1.48 mm. Pedicels and stems annulated throughout. Pedicels of varying length, widening gradually towards hydrothecae, from which they are not sharply demarcated.

Hydrothecae minute, delicate, tubular, slightly constricted in distal half and widening again at margin. Margin sinuous, with low pointed teeth alternating with opercular segments. Operculum of 8-10 segments, leaving a small circular opening between their central points. Diaphragm delicate, but quite

distinct. Perisarc exceedingly delicate throughout. Hydrothecae occasionally regenerated. Hydranth with over 12 tentacles.

Gonothecae arising from hydrorhiza on short annulated pedicels; smooth, elongated, tapering below, truncated above, containing two medusa buds, present in October. Structure of medusa not discernible.

Measurements	Holotype	Paratypes
Pedicel, length .. .. .	0.04-0.38	0.05-0.35
diameter at base .. .. .	0.035-0.06	0.04-0.06
diameter at distal end .. .. .	0.04-0.075	0.045-0.07
Hydrotheca, length from diaphragm .. .. .	0.13-0.25	0.14-0.30
diameter at margin .. .. .	0.09-0.14	0.09-0.12
height/diameter .. .. .	1.18-1.92	1.22-2.74
Gonotheca, length, including pedicel .. .. .	0.51-0.63	
maximum diameter .. .. .	0.21-0.29	

Remarks. In one of the paratypes (FB 131 F) the hydrothecae are slightly longer and the proportion of length to diameter greater, but the measurements

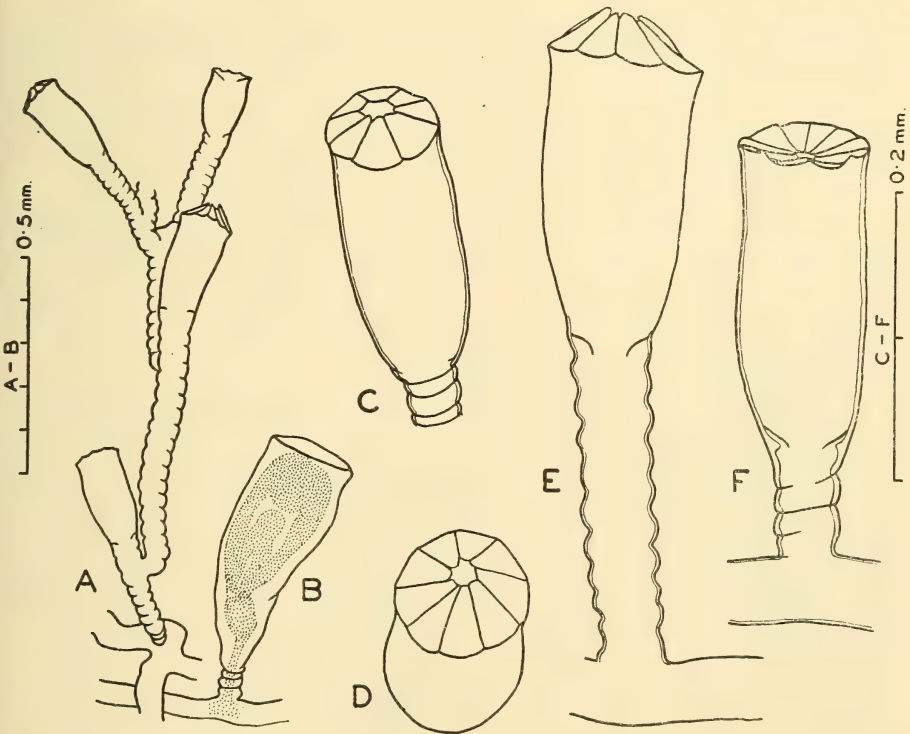


FIG. 7. *Lovenella chiquitita* n. sp.

A. A branching stem bearing hydrothecae. B. A gonotheca. C-F. Solitary hydrothecae from different aspects; F showing an annular thecal thickening below the diaphragm. A, B and E from the holotype, C and F from the paratype FB 131 F, D from the paratype FAL 108 O.

overlap those of the holotype. In the same sample some, but not all, of the hydrothecae possess a slightly thicker perisarc and an annular thecal thickening just below the attachment of the diaphragm. Since this seems to be a variable character it cannot be used to distinguish a separate species. No gonophores were present in this sample.

The species recorded by Vanhöffen 1910 from Simonstown as *Campanulina turrita* Hincks is very similar and may prove to be the same species, although the illustration shows no demarcation between the hydrotheca and the opercular segments.

Of the few species of *Lovenella* described, *L. chiquitita* resembles most closely *L. clausa* (Loven), in which, however, the pedicel is not so distinctly annulated.

Family: **Lafoeidae**

*Hebella furax* n. sp.

Fig. 8

*Types.* Holotype PF 18293 B, part in University of Cape Town, part in S.A. Museum. Paratype FAL 58 Y in University of Cape Town.

*Description.* Colony stolonial. Hydrorhiza parasitic or epizootic on *Lytocarpus filamentosus* (Lamarck). Hydrothecae arising direct from the hydrorhiza on short annulated pedicels, tubular, widening very slightly towards margin; margin smooth, everted. No diaphragm, but a pronounced annular thickening at base of hydrotheca and above it a row of refringent dots.

The species exists in two forms, both of which may occur in the same colony. In the normal, free-living form the hydrorhiza creeps over the stems or hydrocladia of the host, giving rise at intervals to the hydrothecal pedicels. The pedicels bear from 3 to 6 (usually 5) annulations which are twisted in a spiral manner. The hydrotheca is usually somewhat asymmetrical, with the aperture oblique and the margin flaring gracefully.

In the parasitic form the hydrorhiza invades the hydrocladium of the host, obtaining entry apparently through the mamelon at the base, and destroys and replaces the coenosarc. The infected hydrocladia are always dead and broken off short in sharp contrast to the other healthy hydrocladia of the colony. The hydrorhiza of the parasite is naked and has no perisarc covering of its own while in the body of the host. At a different level it emerges through a hydrotheca or through the broken end of the hydrocladium to give rise to a hydrotheca of its own. The pedicel of such a hydrotheca acquires a perisarc covering immediately on emergence; it is much shorter than that of the free-living form, sometimes giving rise at once to a hydrotheca, and sometimes bearing 1 or 2 twisted annulations first. The hydrotheca shows no difference in shape and proportion from the free-living form, but is on the whole smaller.

In both forms reduplications of the margin occasionally occur, and in one example (the paratype FAL 58 Y), two hydrothecae were seen to arise from one pedicel. The polyps are strongly contracted in the material and it was

not possible to determine accurately the number of tentacles, although there appear to be about 17.

No gonophores are present, so that the placing of the species in the genus *Hebella* is provisional.

*Measurements* (mm.)

	<i>Holotype</i>		<i>Paratype</i>
	<i>Free-living</i>	<i>Parasitic</i>	<i>Parasitic</i>
* Pedicel, length .. .. .	0.21-0.66	0.03-0.15	0.04-0.17
maximum diameter .. .. .	0.08-0.14	0.06-0.11	0.08-0.10
* Hydrotheca, length .. .. .	0.77-1.18	0.65-0.84	0.60-0.85
diameter at margin .. .. .	0.36-0.61	0.32-0.54	0.31-0.47
length/diameter .. .. .	1.54-2.14	1.50-2.17	1.81-1.94

\* The base of the hydrotheca is taken as the first indentation below the annular thecal thickening.

*Remarks.* The parasitic condition resembles that found in *Hebella dispolians* (Warren 1909). Here also the hydrorhiza may creep over the surface of the

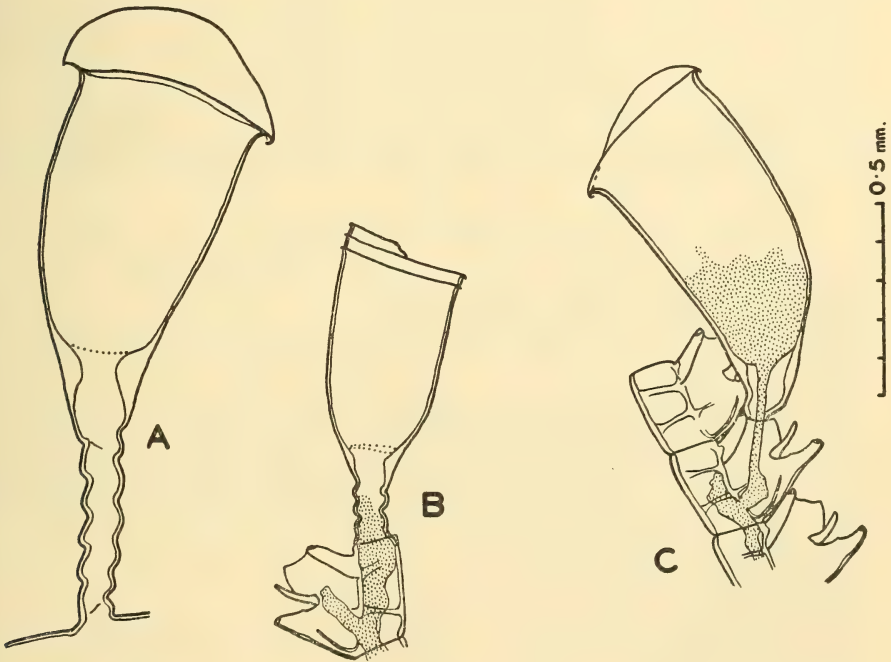


FIG. 8. *Hebella furax* n. sp.

A. The free-living epizootic form, from the holotype. B and C. The parasitic form growing on *Lytocarpus filamentosus*, from the paratype FAL 58 Y.

host and give rise to normal hydrothecae, and may also enter the perisarc of the host and invade its hydrothecae. There are, however, a number of differences; in *H. dispolians* the parasitic hydranths are usually devoid of hydrothecae of their own, the free-living forms have smooth or only slightly wrinkled pedicels, the hydrothecal margin is not everted, the size is smaller, and finally the living coenosarc of the host (a species of *Sertularia*) continues to exist side by side with the parasite, a condition which has not been observed in *H. furax*.

The form and size of the hydrotheca of the non-parasitic form of *H. furax* are very similar to those of *H. parasitica* (Ciamician) but since the latter is not parasitic but epizootic, it is considered advisable to establish a new species for the False Bay material.

*Hebella scandens* (Bale) 1888

*Lafoea scandens* Bale 1888, p. 758; Pl. XIII, figs. 16-19. Warren 1908, p. 341, fig. 21.

*Hebella scandens* Bale 1913, p. 117; Pl. XII, fig. 10. Stechow 1919a, p. 77, fig. Z.

*Hebellopsis scandens* Stechow 1925, p. 442.

*Records.* PF 337 D, 15608 B, 15675 E. FAL 66 J, 78 E, 159 M, 169 V, 207 E, 214 F, 217 S, 223 W, 268 E, 274 Q, 279 M.

*Description.* Dense colonies growing on *Sertularella arbuscula* and other hydroids. Hydrothecae similar to those described by Bale. Gonothecae abundant in some colonies, containing as many as 4 medusae one above the other in successive stages of development. Medusae deep, with 3 long tentacles at time of liberation. Margin of gonotheca with 4 emarginations, each with an opercular flap. Gonangia present in April and September.

*Scandia mutabilis* (Ritchie) 1907

*Campanularia mutabilis* Ritchie 1907, p. 504; Pl. XXIII, figs. 3-5.

*Lafoea magna* Warren 1908, p. 342, fig. 22.

*Scandia mutabilis* Stechow 1919a, p. 79. Fraser 1944, p. 208; Pl. 39, fig. 187.

*Records.* PF 396B.

*Description.* Colony growing on *Thecocarpus giardi*. Numerous hydrothecae borne on pedicels with 6-11 spiral annulations. Near the base of the hydrotheca is an annular thickening of the perisarc similar to that in *Hebella* and *Campanularia*, attached to the upper region of which is a thin, membranous diaphragm. Gonophores absent.

*Measurements* (mm.)

Pedicel, length	..	..	..	..	..	0.43-1.04
maximum diameter	..	..	..	..	..	0.14-0.19
Hydrotheca, length	..	..	..	..	..	1.12-1.54
diameter at margin	..	..	..	..	..	0.61-0.90
length/diameter	..	..	..	..	..	1.47-1.97

*Remarks.* The hydrothecae of this species are very similar to those of *Hebella parasitica* and *H. furax*. However, the measurements of the hydrothecae are somewhat greater, and the pedicel longer.

*Reticularia serpens* (Hassall) 1848

*Fillellum serpens* Hincks 1868, p. 214; Pl. XLI, fig. 4. Stechow 1925, p. 458.

*Coppinia arcta* Hincks 1868, p. 219; Pl. XLI, fig. 5.

*Records.* FAL 20 S, 26 N, 290 E.

*Description.* Colonies growing on *Amphisbetia operculata*, *Aglaophenia pluma* var. *typica*, and *Nemertesia cymodocea*. Hydrothecal margin very slightly everted, and usually with several reduplications. No coppiniae present.

*Measurements* (mm.)

Hydrotheca, length of free part, without reduplications . .	0.09–0.28
length of free part, with reduplications . . . . .	0.16–0.42
diameter at margin . . . . .	0.09–0.15

*Zygophylax cornucopia* Millard 1955

*Zygophylax cornucopia* Millard 1955, p. 219, fig. 3.

*Records.* F 299 B. FB 131 B. FAL 78 S, 169 X, 217 N, 279 E. (Recorded by Millard 1955.)

Family: **Syntheciidae**

*Synthecium ?elegans* Allman 1872

Fig. 9, D

*Synthecium elegans* Allman 1876, p. 266; Pl. XV, figs. 1–3. Billard 1925, p. 129, fig. 5.

*Synthecium subventricosum* Bale 1914, p. 5; Pl. I, figs. 3–5. Stechow 1925, p. 462.

*Records.* PF 15675 G. FAL 66 H.

*Description.* One colony of about a dozen pinnate stems reaching a maximum height of 1.9 cm., and another very young colony without hydrocladia reaching a height of 0.7 cm. Arrangement of lower stem internodes very irregular, some bearing one pair of hydrocladia, others one pair of hydrothecae, and others one pair of each. Arrangement in upper part also sometimes irregular, but usually each internode bears one pair of proximal and one pair of distal hydrothecae with a pair of hydrocladia in the centre.

Hydrocladia divided into regular internodes, but the nodes are sometimes indistinct; occasionally bearing a pair of sub-branches. These arise from the proximal part of a much-elongated internode. Hydrocladia often continued as stolons which anastomose with other parts of the colony. Thecal pairs sub-opposite in proximal parts of hydrocladia, becoming opposite in the 2nd to 3rd pair.

Hydrothecae ventricose below, adnate for over two-thirds of height, those on proximal part of hydrocladium more adnate than those in distal part.

Margin forming an angle of about  $45^\circ$  with hydrocladium, reduplications sometimes present.

Gonophores absent.

*Measurements* (mm.)

Hydrocladium, length of internode	..	..	..	0.60-0.73
Hydrotheca, length abcauline	..	..	..	0.34-0.44
length adcauline, adnate part	..	..	..	0.43-0.54
length adcauline, free part	..	..	..	0.06-0.20
diameter near base	..	..	..	0.14-0.18
diameter at margin	..	..	..	0.20-0.23

*Remarks.* In the absence of gonophores it is not possible to identify this species with certainty, for the trophosome of *S. elegans* is almost indistinguishable from that of *S. patulum* (Busk.). The branching of the hydrocladia shows some resemblance to *S. ramosum* Allman, but is not developed to anywhere near the same extent.

*Syntheceium hians* n. sp.

Fig. 9, A-C

*Types.* Holotype FAL 214 G in University of Cape Town.

*Description.* A single colony of about half a dozen upright stems reaching a maximum height of 3.8 cm., and several fragments. Colour: light brown.

Hydrorhiza tangled, thick, with diameter of stolons equal to that of stem. Stem unfascicled, thick at base, thin and transparent at tip, pinnate, segmentation indistinct in older parts. Arrangement of hydrothecae and hydrocladia very variable, but usually each internode bears 3 pairs of equally spaced hydrothecae and one pair of opposite hydrocladia arising immediately below the second pair of hydrothecae. Hydrothecae in older parts of stem empty and usually eroded, leaving only stumps or scars. Basal part of stem without hydrothecae or hydrocladia.

Hydrocladia unbranched, bearing up to 13 pairs of hydrothecae. Hydrothecae opposite, but often sub-opposite in proximal parts of hydrocladia. There are 2 distinct arrangements. In the younger parts of the colony the hydrocladia arise direct from the stem with no dividing node, and there is always one unpaired hydrotheca at the base, followed by sub-opposite pairs which gradually change to opposite. In the older parts of the colony there is a well-marked transverse node near the base of the hydrocladium, followed immediately by hydrothecal pairs which are opposite or very nearly so. Segmentation of hydrocladium irregular, with a node after 1-4 pairs of hydrothecae.

Hydrotheca narrow at base, widening strongly to margin, adnate for most of its length, only very slightly bent outwards, with the margin forming an angle of between  $50^\circ$  and  $90^\circ$  with the hydrocladium. Margin smooth, everted, often reduplicated. Diaphragm oblique, with outer edge reaching sometimes



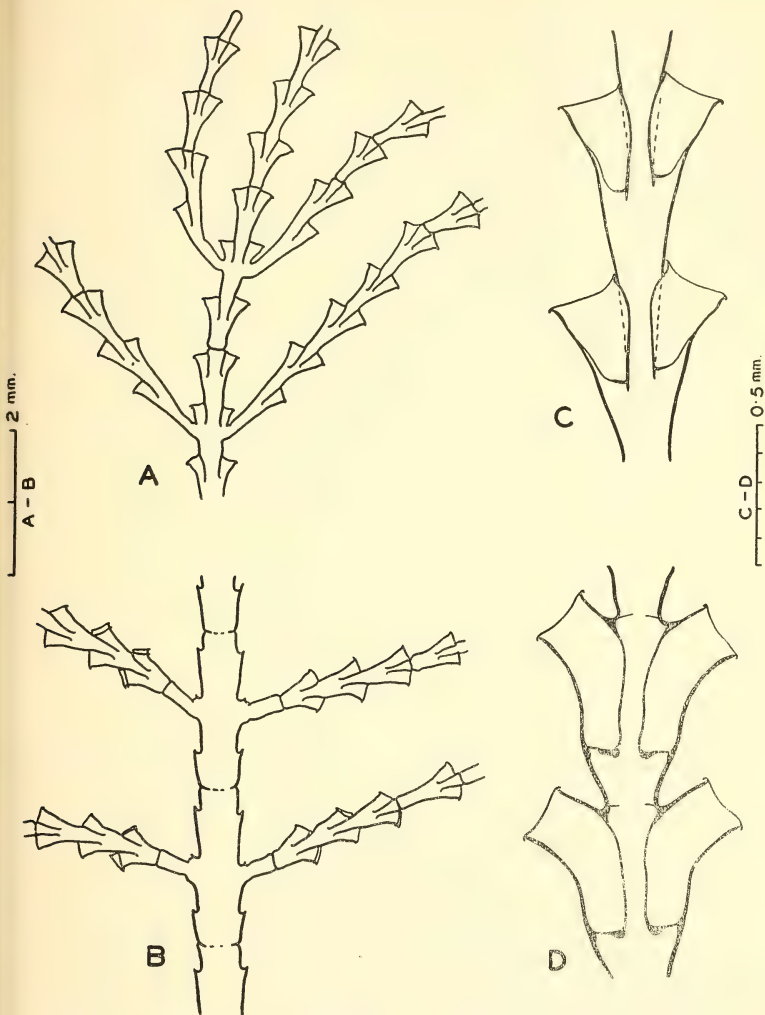


FIG. 9. A-C. *Synthecium hians* n. sp. from the holotype.

A. Stem and hydrocladia from younger part of colony. B. Stem and hydrocladia from older part of colony. C. Two pairs of hydrothecae from a hydrocladium.

D. *Synthecium ?elegans* Allman. Two pairs of hydrothecae from a hydrocladium, FAL 66 H.

as far as half-way up the abcauline wall. Perisarc thin, sometimes thickened below margin on abcauline wall.

Gonophores absent.

*Measurements* (mm.)

Stem, diameter	..	..	..	..	..	..	0.18-0.74
Hydrocladium, distance between 2 consecutive pairs of hydrothecae	..	..	..	..	..	..	0.51-0.74
Hydrotheca, length abcauline, from diaphragm attachment	..	..	..	..	..	..	0.14-0.26
length adcauline, adnate part	..	..	..	..	..	..	0.30-0.37
length adcauline, free part	..	..	..	..	..	..	0.03-0.05
adnate part/adcauline length	..	..	..	..	..	..	0.86-0.92
diameter at level of abcauline diaphragm attachment	..	..	..	..	..	..	0.13-0.17
diameter at margin	..	..	..	..	..	..	0.23-0.27

*Remarks.* This species is very close to *S. chilense* Hartlaub 1905 (which is possibly a synonym for *S. robustum* Nutting 1904). It is, however, smaller in all its measurements, the hydrothecae being approximately half the size, and this fact together with minor differences of shape and proportions make it advisable to establish a new species. The smaller differences between the two species are summarized as follows.

<i>S. hians</i>	<i>S. chilense</i>
1. Hydrorhiza thick, same diameter as stem.	Hydrorhiza considerably thinner than stem.
2. Hydrotheca with about $\frac{1}{10}$ of adcauline wall free.	Hydrotheca with about $\frac{1}{4}$ to $\frac{2}{5}$ of adcauline wall free.
3. Margin distinctly everted.	Margin not, or only slightly everted.
4. Hydrotheca only slightly bent outwards. Margin forms angle of 50-90° with hydrocladium.	Hydrotheca strongly bent outwards. Margin forms angle of 20-45° with hydrocladium.

Family: **Sertulariidae**

*Dictyocladium coactum* Stechow 1923b

*Dictyocladium coactum* Stechow 1925, p. 466, fig. 27.

*Records.* FAL 52 S, 78 C, 95 P, 141 D, 153 U, 174 Y, 183 M, 214 E, 274 W, 288 E.

*Description.* Numerous colonies with normally unbranched stems, reaching a maximum height of 2.2 cm. Rarely a stem will give off one or more side-

branches which arise from within the hydrothecae. Anastomoses between different parts of the colony are occasionally present, but the arrangement is not quite the same as in the genotype of *Dictyocladium* (*D. dichotomum* Allman 1888). Tendril-like structures arise from the tips of the stems, and attach themselves, not to hydrothecae, but to other parts of the hydrotheca.

The gonophores are surrounded by separate annulations and not by a continuous spiral as in *D. dichotomum*. They arise usually from the base of the stem, but sometimes higher up, usually just above the nodes. Some of the gonophores were definitely female, in others the sex was not distinguishable. Present from August to September.

*Salacia articulata* (Pallas) 1766

*Thuiaria persocialis* Allman 1876, p. 271; Pl. XVII, figs. 4-6.

*Thuiaria pectinata* Allman 1888, p. 69; Pl. XXXIII, fig. 1.

*Thuiaria articulata* Ritchie 1909, p. 84, fig. 6.

*Salacia articulata* Stechow 1925, p. 465.

*Dymella articulata* Vervoort 1946a, p. 320.

*Records.* F 254. CP 333 A. PF 351 B, 5013 A, 15608 A. FB 107, 140 D, 141 C. FAL 20 Q, 26 M, 42 S, 52 P, 62 P, 78 B, 95 N, 207 C, 222 D, 268 C, 279 K, 289 A.

*Description.* Common in False Bay, though only occasionally as rich colonies. Gonophores present from July to October.

*Sertularella africana* Stechow 1919a

Figs. 10 I; 11 F.

*Sertularella fusiformis* Warren 1908, p. 295, fig. 5, C and D.

*Sertularella africana* Stechow 1919a, p. 83; 1923c, p. 179, fig. V.

*Records.* F 296 (reported by Eyre 1939). FAL 56 E, 78 V, 125 W.

*Description.* Colonies of solitary, upright and usually unbranched stems. Occasionally a stem bears one or more branches, which may arise from within a hydrotheca or from immediately below it. Maximum height 1.1 cm.

Hydrotheca adnate about one half, with adcauline wall convex and usually weakly striated. In occasional hydrothecae the striations extend all the way round. Abcauline wall varying from slightly convex to straight or even slightly concave, elongated so that the margin of the hydrotheca is not perpendicular to the hydrothecal axis but tilted slightly towards the stem. No internal teeth.

Gonophores spindle-shaped, with narrow opening and 3 marginal teeth. Female larger than male, with wider opening and shorter marginal teeth. External marsupium present. Present in February and August,

*Measurements* (mm.)

Internode, length	..	..	..	..	..	0.29-0.79
diameter across node	..	..	..	..	..	0.13-0.20
Hydrotheca, length abcauline	..	..	..	..	..	0.47-0.63
length adcauline, adnate part				..	..	0.24-0.32
length adcauline, free part	..	..	..	..	..	0.25-0.37
adnate part/adcauline length			..	..	..	0.41-0.54
diameter at mouth	..	..	..	..	..	0.22-0.27
maximum diameter	..	..	..	..	..	0.25-0.33
Gonotheca, male, length	..	..	..	..	..	1.86
maximum diameter	..	..	..	..	..	0.83
Gonotheca, female, length	..	..	..	..	..	1.93-2.36
maximum diameter	..	..	..	..	..	0.81-1.03

*Remarks.* This species can easily be distinguished from *S. polyzonias* by its habit of growth and short, normally unbranched stems. The habit of growth is similar to that of *S. fusiformis* and *S. tenella*. From the former it can be distinguished by the complete absence of internal hydrothecal teeth, and from the latter by the striations on the hydrotheca which normally occur on the adcauline wall only. *S. africana* also differs from all other species without internal teeth in the shape of the hydrotheca, in which the margin is not perpendicular to the axis, but is always tilted at least slightly towards the stem, never away from it as in *S. polyzonias*.

*Sertularella arbuscula* (Lamouroux) 1816

Figs. 10 B, 11 C

*Sertularella crassipes* Allman 1886, p. 133; Pl. VIII, figs. 4-5.

*Sertularella cuneata* Allman 1886, p. 134; Pl. IX, figs. 1-2.

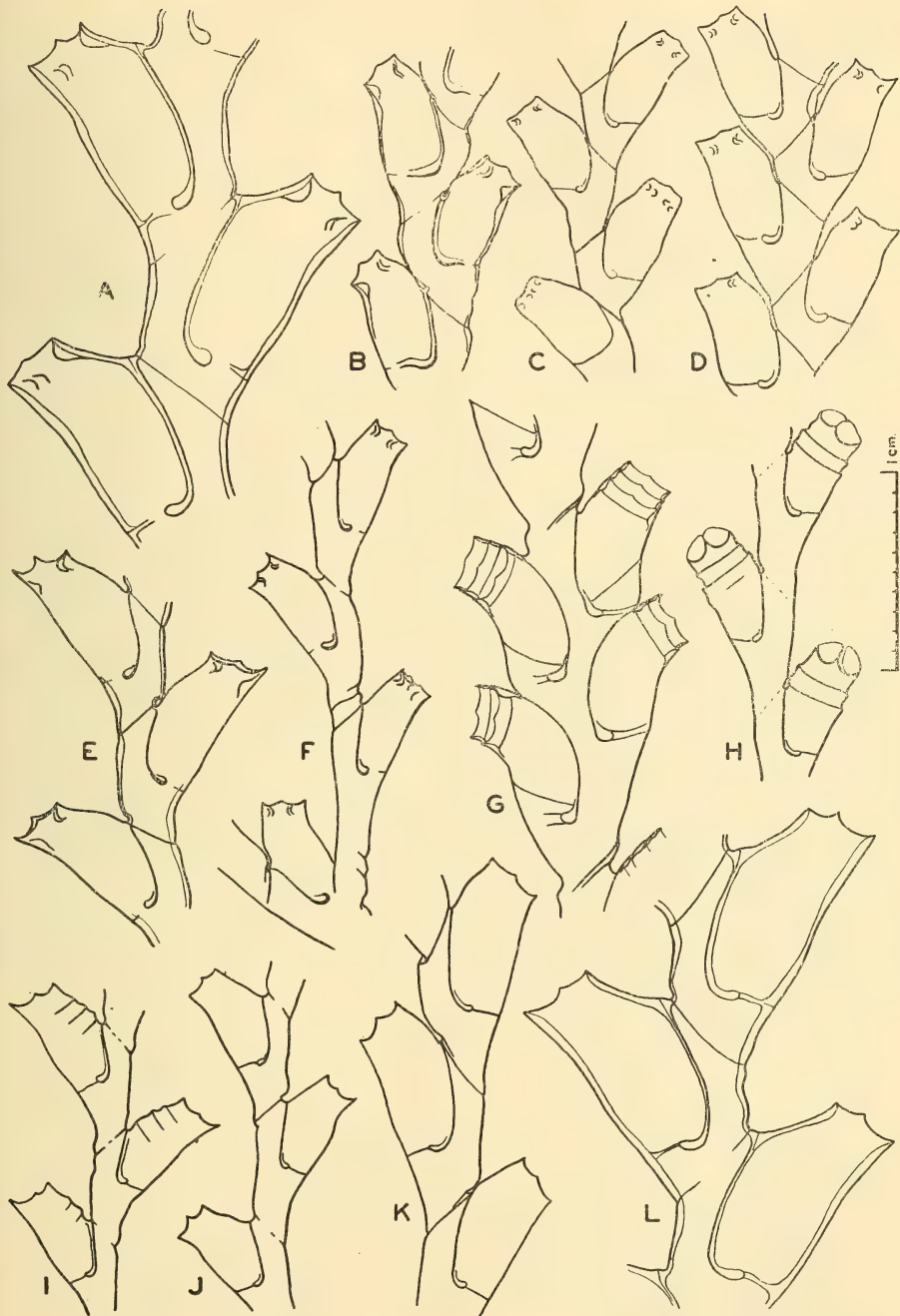
*Sertularella arborea* Marktanner-Turnetscher 1890, p. 221. Ritchie 1907a, p. 534.

*Sertularella tumida* Warren 1908, p. 297, fig. 6 A and C, not B.

*Sertularella arbuscula* Stechow 1925, p. 487.

*Records.* PF 337 C, 15608 C, 15675 C. FB 119 B, 131 E, 133 D. FAL 13 D, 26 G, 42 T, 52 T, 56 C, 62 N, 64 K, 66 K, 78 D, 153 K, 169 U, 183 H, 207 D, 217 R, 268 D, 274 V, 279 N, 292 A.

*Description.* There is nothing to add to the description of this well-known species. It can easily be recognized by its tendency to branch in one plane, forming fan-shaped colonies, by the distinct outward bend in the hydrotheca, the three internal teeth, and the elongated and practically smooth gonotheca. The amount of bend in the hydrotheca, however, varies, and in some individuals the abcauline wall is practically straight. The species is extremely common in False Bay, usually reaching a height of 4-6 cm., although a maximum height of 15.0 cm. has been observed. The colour varies from horn-colour to brown or even black. Gonophores occur in April, and June to October.

FIG. 10. The False Bay species of *Sertularella*.

A. *S. goliathus* Stechow; FAL 222 C. B. *S. arbuscula* (Lamouroux); FB 131 E. C. *S. fusiformis* (Hincks); FAL 52 U. D. *S. fusiformis* (Hincks), form with crowded hydrothecae; FAL 176 V. E. *S. mediterranea* Hartlaub; FAL 66 M. F. *S. falsa* n. sp. from the holotype. G. *S. flabellum* (Allman); FAL 95 Q. H. *S. capensis* n. sp. from the holotype. I. *S. africana* Stechow; FAL 56 E. J. *S. polyzonias* (Linnaeus); FAL 207 F. K. *S. xantha* Stechow; FAL 186 D. L. *S. megista* Stechow; FAL 66 L.

*Measurements (mm.)*

Internode, length .. .. .	0.38-0.71
diameter across node .. .. .	0.23-0.41
Hydrotheca, length abcauline .. .. .	0.41-0.61
length adcauline, adnate part .. .. .	0.27-0.44
length adcauline, free part .. .. .	0.26-0.41
adnate part/adcauline length .. .. .	0.42-0.62
diameter at mouth .. .. .	0.15-0.31
maximum diameter .. .. .	0.27-0.38
Gonotheca, length .. .. .	2.60-2.84
maximum diameter .. .. .	0.82-0.92

*Sertularella capensis* n. sp.

## Fig. 10 H

*Types.* Holotype FB 114 A; paratypes FB 115 D and FAL 64 L, all in University of Cape Town.

*Description.* Rich colonies reaching a height of about 4 cm. Stem unfascicled, flexuous and straggling. Branching irregular and profuse, with most of the branches ending in tendrils which attach to other parts of the colony or to the substratum, uniting the whole into a complex tangled mass. In unattached stems the branching is roughly alternate, each branch arising from below a hydrotheca and forming an angle varying from about 30° to 90° with the stem. The two rows of hydrothecae lie in one plane.

Hydrotheca with a little over half the adcauline wall adnate, broad and squat, with wide mouth. Diameter at mouth only very slightly less than that in widest part. Margin perpendicular to hydrothecal axis or tilted very slightly away from stem, sides straight to slightly convex, distal half with 1-3 distinct annulations equally developed all round hydrotheca. 4 well-developed marginal teeth of equal size. Operculum of 4 pieces. No internal teeth. Hydranth with abcauline blind pouch.

Gonophores absent.

*Measurements (mm.)*

	<i>Holotype</i>	<i>Paratype</i> FAL 64 L
Internode length .. .. .	0.59-0.75	0.50-0.85
diameter across node .. .. .	0.19-0.26	0.17-0.25
Hydrotheca, length abcauline .. .. .	0.41-0.47	0.36-0.44
length adcauline, adnate part .. .. .	0.31-0.35	0.28-0.33
length adcauline, free part .. .. .	0.24-0.31	0.22-0.27
adnate part/adcauline length .. .. .	0.53-0.56	0.51-0.58
diameter at mouth .. .. .	0.25-0.30	0.23-0.27
maximum diameter .. .. .	0.28-0.35	0.29-0.31

*Remarks.* The habit of growth and form of the colony is somewhat similar to *S. polyzonias* and *S. falsa*. From the latter it is distinguished by the absence of

internal hydrothecal teeth, and from both by the shape of the hydrotheca and its striations.

The species is very close to *S. spirifera* Stechow 1931, but lacks the dichotomous branching and has a broader hydrothecal margin.

*Sertularella falsa* n. sp.

Figs. 10 F, 11 D.

*Types and Records.* Holotype FB 119 C, and paratypes FB 131 H, CP 333 B all in University of Cape Town. Further records: FB 133 B. FAL 153 S, 274 U.

*Description.* Hydrorhiza creeping over the surface of other hydroids or weeds, sometimes so thickly as to hide the latter and give the appearance of a fascicled stem. Stem unfascicled, lax, flexuous, and straggling; reaching a maximum height of 2.9 cm., branching irregularly. Terminal parts of stem or branches often with abnormally elongated nodes, and sometimes ending in tendrils which anastomose with other parts of the hydrorhiza. Branches arising from below hydrothecae, sometimes faintly annulated at origin. The two rows of hydrothecae in one plane, nodes distinct and constricted.

Hydrotheca smooth, with approximately half adcauline wall adnate, and with free part bending gently away from stem. Margin not perpendicular to hydrothecal axis, but tilted away from stem, adcauline wall convex, abcauline wall concave in distal half. Mouth not constricted, with 4 marginal teeth of equal size and an operculum of 4 pieces. 4 small and very regular internal teeth, alternating with marginal teeth. Perisarc not exceptionally thick. Hydranth with about 25 tentacles and abcauline blind pouch.

Gonophores elongated, spindle-shaped, smooth in proximal part and with a number of shallow annulations in distal part, and 3 or 4 marginal teeth. Very similar to those of *S. mediterranea*. Present in March, April, August, September and December.

<i>Measurements</i> (mm.)	<i>Holotype</i>	<i>Paratypes</i>
Internode length, excluding abnormal elongated internodes .. .. .	0.54-0.78	0.52-0.87
diameter across node .. .. .	0.14-0.22	0.17-0.27
Hydrotheca, length abcauline .. .. .	0.45-0.52	0.40-0.54
length adcauline, adnate part .. .. .	0.30-0.36	0.26-0.41
length adcauline, free part .. .. .	0.29-0.35	0.28-0.36
adnate part/adcauline length .. .. .	0.47-0.55	0.45-0.61
diameter at mouth .. .. .	0.20-0.23	0.19-0.26
maximum diameter .. .. .	0.24-0.30	0.24-0.32
Gonotheca, male, length .. .. .	1.62-2.38	1.61-1.97
maximum diameter .. .. .	0.60-0.81	0.59-0.66
Gonotheca, female, length .. .. .		2.22-2.55
maximum diameter .. .. .		0.78-0.90

*Remarks.* *S. falsa* is practically identical with *S. polyzonias* in its form of growth, and the shape and size of the hydrotheca. It differs only in the presence of internal teeth. The number, position and size of the internal teeth are remarkably constant in this species. In only one specimen out of the many examined (FAL 153 S) were a few obviously badly worn hydrothecae at the base of the stem found to lack internal teeth.

*Sertularella flabellum* (Allman) 1886

Figs. 10 G, 11 G

*Theocladium flabellum* Allman 1886, p. 149; Pl. XIX, figs. 4-5. 1888, p. 81; Pl. XXXVIII.

*Sertularella flabellum* Stechow 1925, p. 476.

*Records.* FAL 95 Q.

*Description.* A single group of stems reaching a maximum height of 2.4 cm., apparently a young colony since no stem has more than one branch. Number

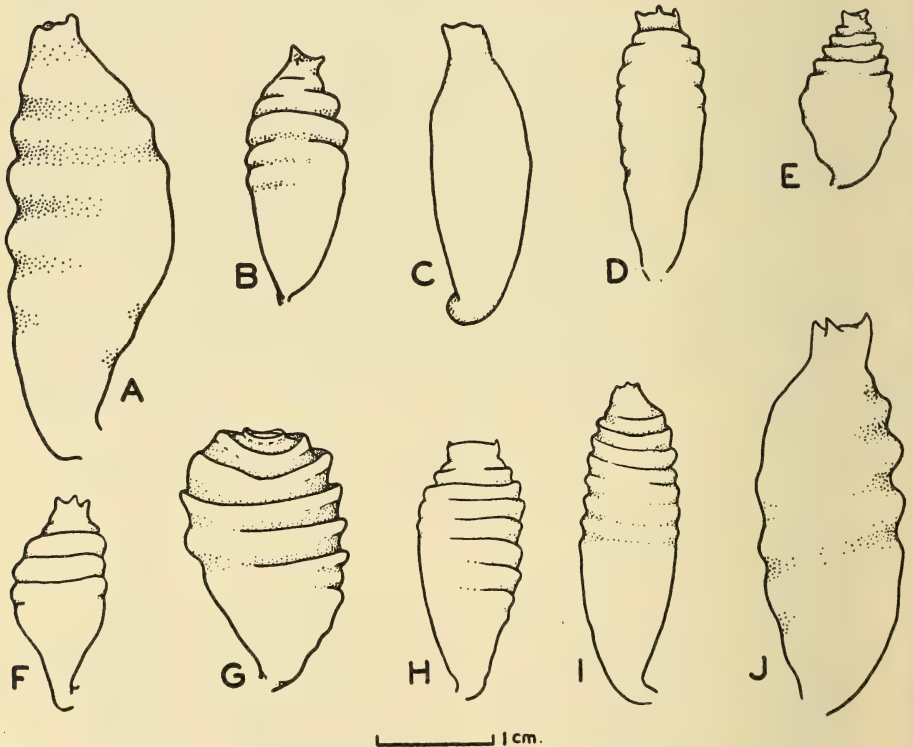


FIG. 11. The gonophores of the False Bay species of *Sertularella*.

A. *S. goliathus* Stechow, male; FAL 222 C. B. *S. mediterranea* Hartlaub, male; FAL 66 M. C. *S. arbuscula* (Lamouroux); FAL 52 T. D. *S. falsa* n. sp. from the holotype. E. *S. fusiformis* (Hincks), male; FAL 52 U. F. *S. africana* Stechow, male; FAL 125 W. G. *S. flabellum* (Allman), female; FAL 95 Q. H. *S. polyzonias* (Linnaeus); FAL 207 F. I. *S. xantha* Stechow (not from False Bay material). J. *S. megista* Stechow, male; FAL 66 L.



of hydrothecae per internode varying from 1-9, but usually between 3 and 6. Hydrotheca with perisarcular thickening around margin, and usually with 2 or more reduplications, which may almost double the length. Otherwise arrangement and shape of hydrothecae exactly as in previous descriptions.

Gonophores present in September, female, each containing one large planula larva.

*Measurements* (mm., the hydrothecal length is measured straight across the curves, and exclusive of reduplications).

Internode length	..	..	..	..	..	1.56-3.65
Hydrotheca, length abcauline	..	..	..	..	..	0.45-0.54
length adcauline, adnate part	..	..	..	..	..	0.43-0.72
length adcauline, free part	..	..	..	..	..	0.06-0.27
adnate part/adcauline length	..	..	..	..	..	0.63-0.92
length of reduplicated part	..	..	..	..	..	0.00-0.46
diameter at margin	..	..	..	..	..	0.27-0.32
maximum diameter	..	..	..	..	..	0.28-0.34
Gonotheca, length	..	..	..	..	..	1.89-2.23
maximum diameter	..	..	..	..	..	1.13-1.43

*Sertularella fusiformis* (Hincks) 1861

Figs. 10 C and D, 11 E

*Sertularella fusiformis* forma *glabra* Broch 1933, p. 69, fig. 27.

*Sertularella lineata* Stechow 1923b, p. 109; 1925, p. 469, fig. 29.

Non *Sertularella fusiformis* Warren 1908, p. 295, fig. 5, C and D.

*Records.* CP 336 B, 356 G. FB 109. FAL 52 U, 153 N, 176 V, 311 R.

*Description.* Stem unfascicled, unbranched or occasionally with 1 or 2 branches, reaching a maximum height of 2.2 cm. Stem smooth or with a slight indication of annulation above and below each node. The two rows of hydrothecae in one plane, or approaching one another very slightly on one side.

Hydrothecae very much more close-set than those figured by Broch, usually smooth, but occasionally with suggestion of annulations,  $\frac{1}{3}$  to  $\frac{1}{2}$  adnate, ventricose, with abcauline wall slightly convex and not elongated, margin perpendicular to hydrothecal axis. Internal teeth present, small, usually 4, alternating with marginal teeth, sometimes one or more wanting.

Gonothecae annulated completely or nearly so, spindle-shaped, with narrow mouth and 3 or 4 marginal teeth. Present in February, April and June.

<i>Measurements</i> (mm.)	<i>False Bay</i>		<i>S. lineata</i>			
	<i>Material</i>		<i>Stechow*</i>			
Internode, length	..	..	..	..	0.31-0.53	0.40-0.60
diameter across node	..	..	..	..	0.15-0.29	0.13-0.16

\* Measurements taken from Stechow's type material loaned by the Munich Museum.

Hydrotheca, length abcauline	..	..	0·44-0·60	0·38-0·55
length adcauline, adnate part	..	..	0·16-0·32	0·21-0·29
length adcauline, free part	..	..	0·28-0·44	0·28-0·34
adnate part/adcauline length	..	..	0·30-0·50	0·40-0·46
diameter at mouth	..	..	0·20-0·25	0·17-0·23
maximum diameter	..	..	0·26-0·33	0·26-0·32
Gonotheca, male, length	..	..	1·46-2·12	
maximum diameter	..	..	0·78-1·89	
Gonotheca, female, length	..	..	1·73-2·16	
maximum diameter	..	..	0·80-0·99	

*Remarks.* As Broch has pointed out, *S. fusiformis* is an exceedingly variable species. The False Bay material resembles Broch's forma *glabra* rather than his forma *ornata*, in that the hydrothecal wall is smooth or nearly so, but differs from both in the shorter internodes and more crowded hydrothecae. All degrees of this crowding can be found, in some stems the margin of one hydrotheca barely reaches the base of the next one, in others the margin of one hydrotheca reaches nearly half-way up the length of the next one and practically to the base of the following one on the same side (fig. 10 D). In these extreme forms no sign of the normal annulation above and below the internode can be seen.

*S. fusiformis* includes *S. lineata* Stechow 1923b. Stechow's material, of which I have been able to examine a prepared slide, has more definite annulations on the hydrotheca, and above and below the nodes of the stem. The thecal annulations are not so well defined as in forma *ornata*, although approaching this condition. The hydrothecae are somewhat smaller than the False Bay material, but more variable in size than suggested by Stechow, and the range overlaps that of the False Bay material. The perisarc is described as being of 'sehr beträchtlicher Dicke', but the thickness in fact varies from 0·01 to 0·04 mm. in different parts of the colony. The False Bay material is similarly variable (under 0·01 to 0·05 mm.). The annulations described at the base of the stem in *S. lineata* are present in some stems of *S. fusiformis*, but usually the hydrothecae commence immediately.

Broch has remarked also on the variable nature of the internal teeth in *S. fusiformis*. In the False Bay material the normal condition appears to be 4 minute internal teeth alternating with the marginal teeth. But these teeth are apparently extremely delicate, and very easily become lost or eroded, with the result that many hydrothecae have some or all of them missing. It is often necessary to examine a large number to find a perfect hydrotheca with all teeth in position. However, any remaining teeth always have their correct position, i.e. they alternate with the marginal teeth, and there is no danger of confusing the species with a 3-toothed one such as *S. mediterranea*.

*S. fusiformis* can be distinguished from other closely related species with internal teeth by the shape of the hydrotheca. The margin is more or less

perpendicular to the axis, whereas in *S. mediterranea* the lengthening of the abcauline wall causes the margin to be tilted towards the stem, and in *S. arbuscula* and *S. falsa* the margin is tilted away from the stem. From *S. pulchra* it differs in the simple stem and generally smaller proportions.

*Sertularella goliathus* Stechow 1923b

Figs. 10 A, 11 A

*Sertularella goliathus* Stechow 1923 b, p. 112; 1925, p. 481, fig. 37.

Records. PF 15608 D. FAL 52 Y, 222 C.

*Description.* A few fascicled stems reaching a maximum height of 3.4 cm., and a number of broken fragments. Nodes of stem and branches usually very faint or invisible, though quite distinct on occasional branches. Three large internal teeth in hydrotheca, of which 1 is adcauline and 2 abcauline. Hydrotheca with  $\frac{1}{2}$  to  $\frac{2}{3}$  adcauline side adnate.

Gonothecae (not previously described) borne on the branches immediately above the hydrothecae, large, spindle-shaped, with about 5 deep and smoothly rounded rings around distal portion, and 3 bluntly rounded teeth at margin. Present in June and September.

*Measurements* (mm.)

Internode, length	..	..	..	..	..	0.67-0.95
diameter across node	..	..	..	..	..	0.40-0.76
Hydrotheca, length abcauline	..	..	..	..	..	0.90-1.14
length adcauline, adnate part	..	..	..	..	..	0.50-0.94
length adcauline, free part	..	..	..	..	..	0.33-0.59
adnate part/adcauline length	..	..	..	..	..	0.46-0.73
diameter at margin	..	..	..	..	..	0.32-0.41
maximum diameter	..	..	..	..	..	0.48-0.61
Gonotheca, length	..	..	..	..	..	2.90-3.98
maximum diameter	..	..	..	..	..	1.22-1.58

*Remarks.* This species differs from *S. arbuscula* in the position of the internal hydrothecal teeth. In the latter species 1 tooth is abcauline and 2 adcauline. Stechow is not clear on this point, since in his figure of *S. goliathus* he shows some of the hydrothecae with one adcauline tooth, and some with one abcauline tooth. Examination of Stechow's type material shows that the former condition always prevails. In the False Bay material the abcauline length of the hydrotheca is slightly greater than that recorded by Stechow.

*Sertularella mediterranea* Hartlaub 1901

Figs. 10 E, 11 B

*Sertularella polyzonias* Warren 1908, p. 291, fig. 5 A, B; Pl. XLVII, figs. 18-20.

*Sertularella mediterranea* Stechow 1923c, p. 189, fig. C<sup>1</sup> and D<sup>1</sup>a. Broch 1933, p. 76. Vervoort 1946a, p. 312; 1949, p. 150, fig. 5.

Records. FAL 66 M, 78 F, 153 P, 183 J.

*Description.* Colonies with unfascicled stems reaching a maximum height of 3.4 cm., branching occasionally in an irregular fashion. The two rows of hydrothecae in one plane.

Hydrothecae with  $\frac{1}{3}$  to a little over  $\frac{1}{2}$  of adcauline wall adnate, abcauline wall elongated, so that margin is not perpendicular to hydrothecal axis but inclined towards the stem. Internal teeth 3, 1 abcauline and 2 adcauline, large.

Male gonotheca elongated, annulated in distal half, although the degree of annulation varies considerably, some specimens being almost smooth; narrowing to margin which bears 3 or 4 teeth. Present in April, and July to September.

*Measurements* (mm.)

Internode, length	..	..	..	..	..	0.44-0.69
diameter across node	..	..	..	..	..	0.25-0.36
Hydrotheca, length abcauline	..	..	..	..	..	0.65-0.86
length adcauline, adnate part	..	..	..	..	..	0.33-0.46
length adcauline, free part	..	..	..	..	..	0.33-0.64
adnate part/adcauline length	..	..	..	..	..	0.37-0.58
diameter at mouth	..	..	..	..	..	0.22-0.35
maximum diameter	..	..	..	..	..	0.31-0.39
Gonotheca, male, length	..	..	..	..	..	2.25-3.00
maximum diameter	..	..	..	..	..	0.85-1.15

*Remarks.* The author follows Stechow, Broch and Vervoort in maintaining *S. mediterranea* Hartlaub and *S. polyzonias* (Linnaeus) as separate species, the former being distinguished by the presence of internal teeth in the hydrotheca. *S. mediterranea* can be distinguished from *S. arbuscula* and *S. fusiformis* by the fact that the abcauline wall of the hydrotheca is elongated so that the margin is tilted towards the stem.

The number and position of the internal hydrothecal teeth is constant in all the material examined. In one example, however (FAL 153 P), 2 minute extra teeth were observed, one on each side of the abcauline one.

One of the colonies (FAL 153 P) bears enlarged hydrothecae similar to those described by Warren 1908 and ascribed by him to the parasitic larva of a pycnogonid.

*Sertularella megista* Stechow 1923b

Figs. 10 L, 11 J

*Sertularella megista* Stechow 1925, p. 480, fig. 36.

*Records.* FAL 52 R, 66 L, 153 M, 169 T, 183 G, 274 T, 279 L.

*Description.* Stiff, erect colonies reaching a maximum height of 8.7 cm. Stem fascicled and about 3 mm. thick at base, branching irregularly. The terminal branchlets show a tendency to an alternate arrangement in one plane, but there is no regularity in this system. Individual branches are often enormously elongated and may stretch for over 3 cm. without bearing sub-branches.

Unfascicled branches straight and of equal thickness throughout. Nodes usually clearly visible, but sometimes becoming obscure in the lower parts of the colony. The two rows of hydrothecae in one plane.

Hydrothecae as described by Stechow, very large, adnate for over half adcauline side, then bending sharply outwards narrowing towards margin which forms an angle of about  $45^\circ$  with hydrocladium. Free part of adcauline side and distal part of abcauline side both slightly concave. Perisarc of variable thickness, varying from about 0.025 to 0.05 mm. thick on abcauline side of hydrotheca. No internal teeth.

Gonophores (not previously described) very large, spindle-shaped, with 4 or 5 broad and deep annulations in distal part, margin with 3 or 4 pointed teeth. Sex probably male in those examined.

*Measurements* (mm.)

Internode, length	..	..	..	..	..	0.71-0.98
diameter across node	..	..	..	..	..	0.40-0.69
Hydrotheca, length abcauline	..	..	..	..	..	0.90-1.13
length adcauline, adnate part	..	..	..	..	..	0.67-0.90
length adcauline, free part	..	..	..	..	..	0.39-0.55
adnate part/adcauline length	..	..	..	..	..	0.55-0.69
diameter at mouth	..	..	..	..	..	0.33-0.45
maximum diameter	..	..	..	..	..	0.47-0.61
Gonotheca, length	..	..	..	..	..	3.33-3.80
maximum diameter	..	..	..	..	..	0.85-1.50

*Remarks.* Under *S. megista* Stechow described an unfascicled stem reaching a maximum height of 3.5 cm. It is evident that he had before him young colonies of the species. Such stems have often been observed growing side by side with strongly fascicled stems. Young colonies appear to reach a height of  $1\frac{1}{2}$  to several cms. before they produce the first branch and develop the accompanying tubes of the stem. In the present material some of the colonies are characteristically marked by dark tips to the branches. Gonophores were observed from June to September.

In general appearance and in size *S. megista* is almost exactly like *S. goliathus*, and the only sure way of distinction is by the absence of internal teeth. In general appearance it is also like *S. longa* (= *S. xantha*), but the size of the hydrothecae and gonothecae is much greater.

*Sertularella polyzonias* (Linnaeus) 1758

Figs. 10 J, 11 H

*Sertularella polyzonias* Hincks 1868, p. 235; Pl. XLVI, fig. 1. Hartlaub 1905, p. 655, figs. T<sup>4</sup> and U<sup>4</sup>. Broch 1918, p. 101; 1933, p. 65, fig. 24. Stechow 1923c, p. 194, fig. D<sup>1</sup>c. Vervoort 1946, p. 224, fig. 96.

Non *Sertularella polyzonias* Warren 1908, p. 291, fig. 5, A and B; Pl. XLVII, figs. 18-20.

*Records.* ?CP 20. PF 15608 E, 15675 D. FAL 207 F, 282 Z.

*Description.* Stem flexuous, straggling, unbranched or branched irregularly, usually growing on other hydroids. Ends of branches often forming tendrils which reunite with the hydrorhiza. Both rows of hydrothecae in one plane or directed slightly to one side. Hydrotheca smooth, with about  $\frac{1}{2}$  adcauline side adnate, bending gently away from stem, abcauline wall not elongated and margin making an angle of about  $45^\circ$  with stem. No sign of internal teeth.

Gonotheca spindle-shaped, annulated for distal  $\frac{2}{3}$ , with 3-5 pointed teeth at margin. Female larger than male, with external marsupium. Present in September and October.

*Measurements* (mm.)

Internode, length	..	..	..	..	..	0.48-1.21
diameter across node	..	..	..	..	..	0.13-0.20
Hydrotheca, length abcauline	..	..	..	..	..	0.45-0.59
length adcauline, adnate part	..	..	..	..	..	0.27-0.38
length adcauline, free part	..	..	..	..	..	0.23-0.35
adnate part/adcauline length	..	..	..	..	..	0.44-0.61
diameter at mouth	..	..	..	..	..	0.19-0.27
maximum diameter	..	..	..	..	..	0.25-0.32
Gonotheca, male, length	..	..	..	..	..	1.57-1.69
maximum diameter	..	..	..	..	..	0.60-0.66
Gonotheca, female, length	..	..	..	..	..	2.21-2.23
maximum diameter	..	..	..	..	..	0.92-0.93

*Remarks.* The False Bay material, in the light of its slender, unfascicled stems, belongs to the cosmopolitan forma *typica* (discussion: Broch 1918), rather than to forma *gigantea*.

*Sertularella xantha* Stechow 1923b

Figs. 10 K, 11 I

*Sertularella xantha* Stechow 1925, p. 472, fig. 32.

*Sertularella longa* Stechow 1923b, p. 110; 1925, p. 483, fig. 38.

*Records.* FAL 186 D, 217 T.

*Description.* Straggling stems reaching a maximum height of 6.4 cm., weakly fascicled at base, irregularly branched. Hydrocladia borne on stem and branches, arising immediately below hydrothecae, alternate, usually with 3 hydrothecae between 2 branches, up to 2 cm. in length. Segmentation indistinct on lower parts of stem, distinct on distal extremities and on hydrocladia. Internodes very variable in length, usually long on stem and branches, but becoming shorter towards the extremities and on hydrocladia. Both rows of hydrothecae in same plane. Perisarc fairly thick on stem, much thinner on hydrocladia; perisarc of hydrothecae also thicker on stem than on hydrocladia. Hydrotheca with  $\frac{1}{2}$  to  $\frac{2}{3}$  adcauline wall adnate; abcauline wall slightly concave,

with a perisarcular thickening below margin; level of margin not quite perpendicular to hydrothecal axis, but tilted slightly away from hydrocladium, forming an angle of  $45^\circ$  with hydrocladium. No internal hydrothecal teeth.

Gonotheca borne on side of hydrocladium and opposite the base of a hydrotheca, very large, spindle-shaped, with 5-10 distinct annulations in distal part, and 3-4 small blunt teeth at margin. An external marsupium observed once only. Present in September.

*Measurements* (mm.)

Internode length	..	..	..	..	..	0.67-1.09
diameter across node	..	..	..	..	..	0.16-0.38
Hydrotheca, length abcauline	..	..	..	..	..	0.57-0.66
length adcauline, adnate part	..	..	..	..	..	0.42-0.51
length adcauline, free part	..	..	..	..	..	0.30-0.40
adnate part/adcauline length	..	..	..	..	..	0.51-0.62
diameter at mouth	..	..	..	..	..	0.25-0.31
maximum diameter	..	..	..	..	..	0.31-0.36
Gonotheca, length	..	..	..	..	..	3.03-3.58
maximum diameter	..	..	..	..	..	0.99-1.34

*Remarks.* Stechow's *S. longa* is considered to be a synonym for *S. xantha*. The only real feature which distinguishes the two in his description is the length of the internodes, which are said to be 'ziemlich kurz' (0.7 mm.) in *S. longa*, and 'lang' (1 mm.) in *S. xantha*. In the present material the internode length varies in different parts of the colony, and the range of variation includes both Stechow's figures. Further, examination of prepared slides of Stechow's types shows that here too the internode length is in fact variable, ranging from 0.72 to 1.13 mm. in *S. longa* and from 0.90 to 1.16 mm. in *S. xantha*. In other details too the False Bay material combines features of both species, thus the hydrothecae are solid as in *S. longa* in the older parts of the colony, delicate as in *S. xantha* in the younger parts; the angle which the hydrocladium makes with the stem varies and may be almost a right angle as in *S. xantha*, or sharp as in *S. longa*; the hydrothecae are adnate for  $\frac{1}{2}$  to  $\frac{2}{3}$ . Although the height of the colony in this material is less than that of either of Stechow's species, other material from the Agulhas Bank (to be described in a future paper) exceeds that of *S. longa* (23 cm., Stechow). It seems, therefore, that there is no justification for keeping the two species apart, and of the two *S. xantha* has priority.

*Symplectoscyphus macrogonus* (Trebilcock) 1928

*Sertularella macrogona* Trebilcock 1928, p. 11; Pl. I, fig. 4.

*Records.* F. 268. CP 326 B, 356 F, 380, 426 M. FAL 78 H, 132 W, 141 C, 153 T, 160 V:

*Description.* Hydrorhiza creeping, usually on weeds, forming a loose network. Stem usually unbranched and about 0.8 cm. in height. Occasionally, however, branching forms occur, resulting in a shrubby colony about 3.2 cm. in height.

Here the stem is often interrupted by densely annulated regions devoid of hydrothecae. Anastomosing tendrils often arise from within the hydrothecae, and in the branching form unite the colony into a dense mesh-work.

The angle which the two rows of hydrothecae make with one another varies. In some cases the two rows are exactly opposite and lie in the same plane, in others the two rows are inclined towards one another forming an angle between them which may be as small as  $45^\circ$ . The two extremes are seldom present in one colony, some colonies tending towards a large angle, and others to a small one, but all intermediate stages occur.

Hydrothecal aperture occasionally at right angles to the stem as described by Trebilcock, but more usually directed away from the stem. Three internal teeth usually present, alternating with marginal teeth. Margin often reduplicated.

Gonothecae as described by Trebilcock, present in February to May, July, August and December.

*Measurements* (mm.)

Internode length	..	..	..	..	..	0.21-0.29
Hydrotheca, length abcauline	..	..	..	..	..	0.24-0.32
length adcauline, adnate part	..	..	..	..	..	0.08-0.17
length adcauline, free part	..	..	..	..	..	0.16-0.24
adnate part/adcauline length	..	..	..	..	..	0.25-0.52
diameter at mouth	..	..	..	..	..	0.11-0.145
Gonotheca, length	..	..	..	..	..	1.20-1.42
maximum width	..	..	..	..	..	0.79-1.14

*Remarks.* This is the first record of this New Zealand species from South Africa, and in view of its fairly common distribution here it is surprising that it has not been reported before.

The False Bay material differs from that of Trebilcock in the presence of internal hydrothecal teeth. However, this is apparently not a constant feature for the species, for although internal teeth are normally present, they may be absent in several hydrothecae on a stem, or even on a complete stem. It cannot therefore be used to establish a separate species. In other respects (including the general appearance of the colony, the annulated base of the stem and the structure of the gonotheca) the material conforms to Trebilcock's description.

*Amphisbetia bidens* (Bale) 1884

*Sertularia bidens* Bale 1884, p. 70; P. VI, fig. 6; Pl. XIX, fig. 1. Warren 1908, p. 310, fig. 10.

*Records.* FAL 66 N.

*Description.* One fragment 2.5 cm. long, without rootstock or basal part of stem. Nodes of stem faint, but quite definite. Hydrocladia long, bearing as many as 16 pairs of hydrothecae, and in one case branched. Internodes bearing up to 12 pairs hydrothecae.



Hydrothecae with comparatively short marginal teeth. Operculum of 2 membranous valves, of which the adcauline is the larger, meeting in the form of a low pyramid above the aperture. The valves are not attached to the marginal teeth, but are hinged to the margin of the hydrotheca in the bays between the teeth. When the marginal teeth are short they do not reach the level of the top of the pyramid, but when longer project beyond it.

Gonophores absent.

*Amphisbetia minima* (Thompson) 1879

*Sertularia minima* Allman 1886, p. 138; Pl. XIII, figs. 3-4. Bale 1884, p. 89; Pl. IV, figs. 9-10; Pl. XIX, figs. 12-13. 1915, p. 269. 1924, p. 248.

*Sertularia crinoidea* Allman 1886, p. 141; Pl. XVI, figs. 1-2.

*Records.* FAL 153 V.

*Description.* One small colony, without gonothecae, reaching a maximum height of 0.3 cm. Hydrorhiza with very thick perisarc and internal chitinous supports. Stem with 2 or 3 hinge-joints in basal part (as described by Allman for *S. crinoidea*) and up to 9 pairs of hydrothecae. Nematothecae visible on some internodes as low tubular structures, slightly expanding towards aperture. No nematophores visible. Operculum too badly preserved to see detail.

*Amphisbetia operculata* (Linnaeus) 1758

*Sertularia operculata* Hincks 1868, p. 263; Pl. LIV. Bale 1884, p. 67; Pl. VI, fig. 1; Pl. XIX, fig. 3. 1915, p. 274.

*Records.* FB 104, 105, 119 J, 122, 133 C. FAL 20 P, 52 Q, 62 M, 78 A, 108 H, 153 L, 217 Q.

*Description.* Common in dredgings, reaching a maximum height of 14.8 cm. Branching very variable: dichotomous, but one fork often of much longer growth than the other, resulting in a long-drawn-out colony. The 2 rows of hydrothecae not always in one plane, but often shifted slightly on to one side of the stem, although never in contact except in the axils of the branches. Hydrothecae almost completely adnate, marginal teeth of unequal size. Operculum of 2 membranous valves but, unlike *A. bidens*, they appear to be attached to the marginal teeth at the sides. Adcauline valve divided into two by a median line. Gonophores present in April, June to September, and November.

*Sertularia distans* (Lamouroux) 1816 var. *gracilis* Hassall 1848

Fig. 12

*Sertularia gracilis* Hincks 1868, p. 262; Pl. LIII, fig. 2. Stechow 1913a, p. 146, figs. 121-124.

*Dynamena gracilis* Marktanner-Turneretscher 1890, p. 240; Pl. V, fig. 3.

*Tridentata gracilis* Stechow 1923c, p. 208, fig. G<sup>1</sup>.

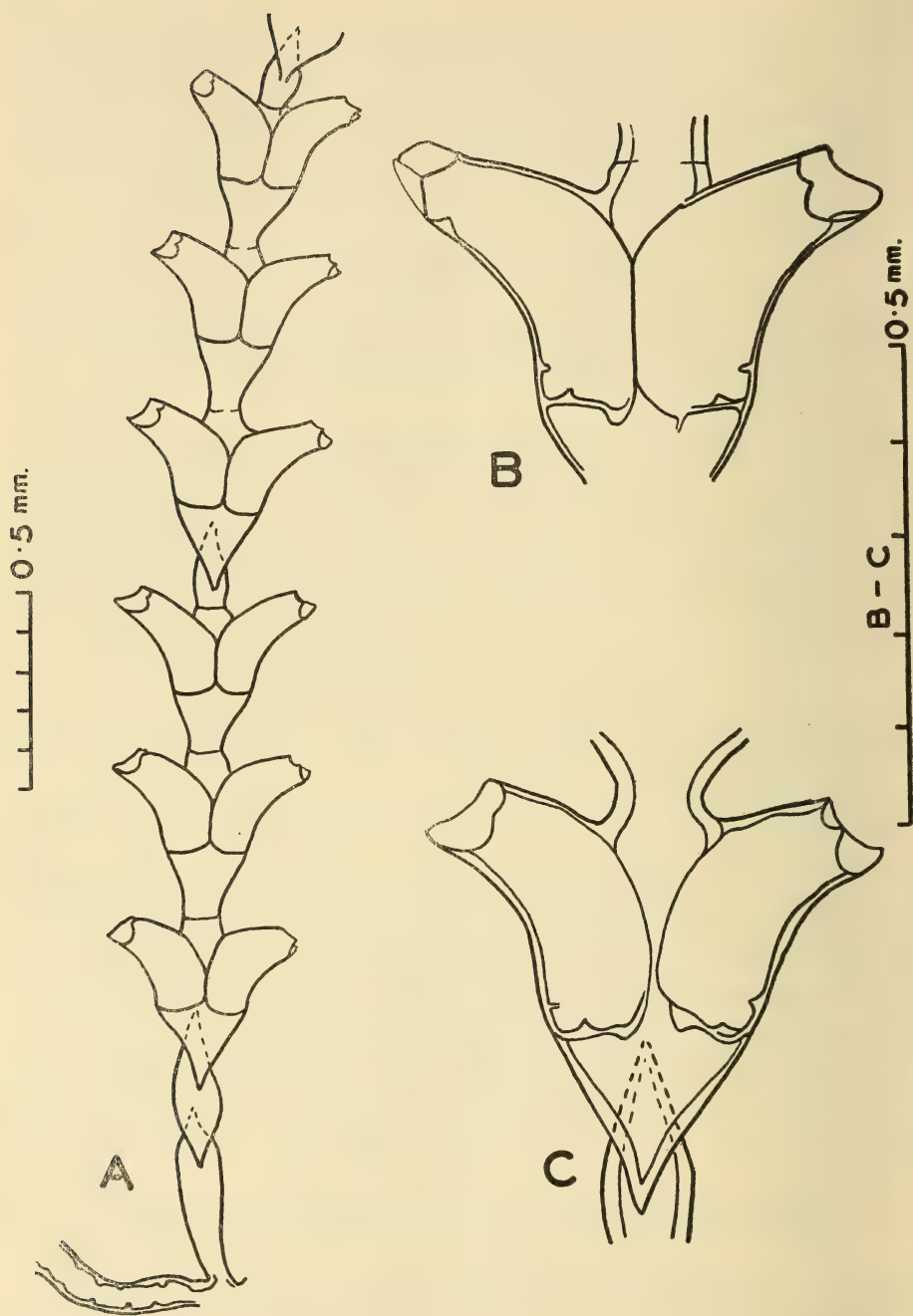


FIG. 12. *Sertularia distans* (Lamouroux) var. *gracilis* Hassall, FAL 78 J.

A. Portion of an upright stem. B. A pair of hydrothecae from the centre of the stem, and C. from the lower part of the stem.

*Sertularia distans* var. *gracilis* Billard 1925, p. 175, fig. 33. Leloup 1935, p. 47, figs. 28-29. 1937a, p. 105, fig. 8.

*Records.* FAL 78 J, 311 S.

*Description.* Hydrorhiza creeping, supported by internal thickenings of perisarc. Stem unbranched, reaching a maximum height of 0.8 cm., and bearing up to 17 pairs of hydrothecae (but usually about 5-8). Basal athecate part of stem terminated by 1 or 2 hinge-joints. Rest of stem divided into thecate internodes each bearing a pair of opposite hydrothecae and bounded by transverse nodes, which, however, are usually very faint or even invisible. Short athecate internodes interpolated at irregular intervals (after 1-4 thecate internodes), each bounded proximally by a transverse node and distally by an oblique node. Pairs of hydrothecae fairly close, generally separated by a distance approximately equal to height of hydrotheca, but tending to be closer in distal part of stem. Members of a pair in contact for a little under half their height on anterior surface, but first one or two pairs much less than this or not meeting at all; free on posterior surface. Line of contact straight, rest of hydrothecae diverging at an angle of about 45°.

Hydrothecae with parallel sides in lower part, narrowing towards margin in upper part, those on lower part of stem sometimes slightly shorter and wider than those on upper part. Margin with a prominent triangular tooth on each side and usually a small median one on adcauline side; often reduplicated. Operculum of 2 valves, the adcauline smaller and divided by a median line. An internal tooth sometimes present immediately below margin on abcauline side. Three peg-like processes of perisarc in basal region of hydrotheca, one on abcauline wall near base, one resting on outer part of base, and a third projecting downwards below adcauline wall. Hydranth with abcauline blind pouch.

Gonophores absent.

*Measurements* (in mm., exclusive of lateral teeth or reduplications)

Stem, length of basal part .. .. .	0.41-0.64
Internode, thecate, length .. .. .	0.34-0.42
thecate, diameter at node .. .. .	0.06-0.09
athecate, length .. .. .	0.15-0.25
Hydrotheca, length, abcauline .. .. .	0.21-0.28
length adcauline, adnate part .. .. .	0.20-0.24
length adcauline, free part .. .. .	0.12-0.17
length adcauline, contiguous part .. .. .	0.00-0.20
diameter at base .. .. .	0.07-0.12
diameter at margin .. .. .	0.08-0.09

*Remarks.* This is the first time this species has been recorded from South Africa.

*Sertularia marginata* (Kirchenpauer) 1864

Fig. 13

*Sertularia marginata* Totton 1930, p. 204 (synonymy), fig. 48b.*Records.* PF 15608 F.

*Description.* A single colony reaching 3 cm. in height, including both pinnate and unbranched stems. Hydrorhiza creeping on alga and containing internal perisarcular supports in some regions only.

Pinnate stem with short athecate basal portion (under 1.5 mm.) containing 1, or occasionally 2, transverse nodes, and terminated by 1, or occasionally 2, hinge-joints. 1-4 pairs of hydrothecae (usually 1) present between hinge-joint and first hydrocladium. Rest of stem divided into regular internodes by very slightly oblique nodes which tend to be indistinct in lower parts. Each internode bearing one hydrocladium with a hydrotheca in its axil and above it a pair of alternate or subopposite hydrothecae. Occasionally an internode with one pair of hydrothecae and no hydrocladium, and occasionally a short athecate internode terminated by a hinge-joint. Hydrothecae below first hydrocladium and above last in opposite or subopposite pairs. Hydrothecae borne on front of stem, members of a pair not making contact with each other except in distal region.

Hydrocladium borne on a fairly long apophysis from stem internode and separated from it by a transverse node. First (and occasionally second) internode short, athecate, terminated by hinge-joint. Remainder divided by oblique nodes into regular internodes, each bearing a pair of hydrothecae. Occasionally an extra transverse node separates off the distal end of an internode. Members of a pair of hydrothecae usually contiguous.

Hydrocladia often branching again in an alternate and pinnate manner. Those internodes giving rise to branches arranged as stem internodes, i.e. each bears one branch with a hydrotheca in its axil, and above it a pair of subopposite hydrothecae. The internodes immediately below show a gradual displacement of the hydrothecal pairs to this arrangement. Structure of branches exactly as hydrocladia.

Simple stem with basal part similar to pinnate stem. Remainder divided by oblique nodes into fairly regular internodes, each bearing a pair of opposite hydrothecae. Occasionally an extra athecate internode terminating in a hinge-joint. Members of a pair of hydrothecae separate in lower part of stem, contiguous in distal part.

Hydrothecae swollen below, narrowing to mouth, adnate for over half height then bent outwards, with intrathecal ridge on abcauline wall which may be absent in distal parts of colony. Margin with 2 prominent, sharp, lateral teeth, and a small median adcauline tooth. No internal teeth, but margin sometimes thickened. Operculum of 2 delicate flaps, the adcauline smaller and divided by a median line. Hydranth with abcauline blind pouch.

Gonophores absent.

Measurements (mm.)

Pinnate stem, internode length	..	..	..	..	0.75-1.10
diameter at node	..	..	..	..	0.11-0.20
Hydrocladium, internode (without branch), length	..	..	..	..	0.44-0.66
internode (with branch), length	..	..	..	..	0.85-0.90
diameter at base of hydrothecae	..	..	..	..	0.22-0.34
Simple stem, internode length	..	..	..	..	0.49-0.72
diameter at base of hydrothecae	..	..	..	..	0.29-0.33
Hydrotheca, length, abcauline	..	..	..	..	0.20-0.26
length, adcauline, adnate part	..	..	..	..	0.23-0.31
length adcauline, free part	..	..	..	..	0.08-0.21
length adcauline, contiguous part	..	..	..	..	0.00-0.19
maximum diameter	..	..	..	..	0.16-0.26
diameter at mouth	..	..	..	..	0.12-0.19

Remarks. This is the first record of the species from South Africa. A full description has been given, since, in the absence of gonophores, the identification cannot be absolutely certain. Further, no types were available for

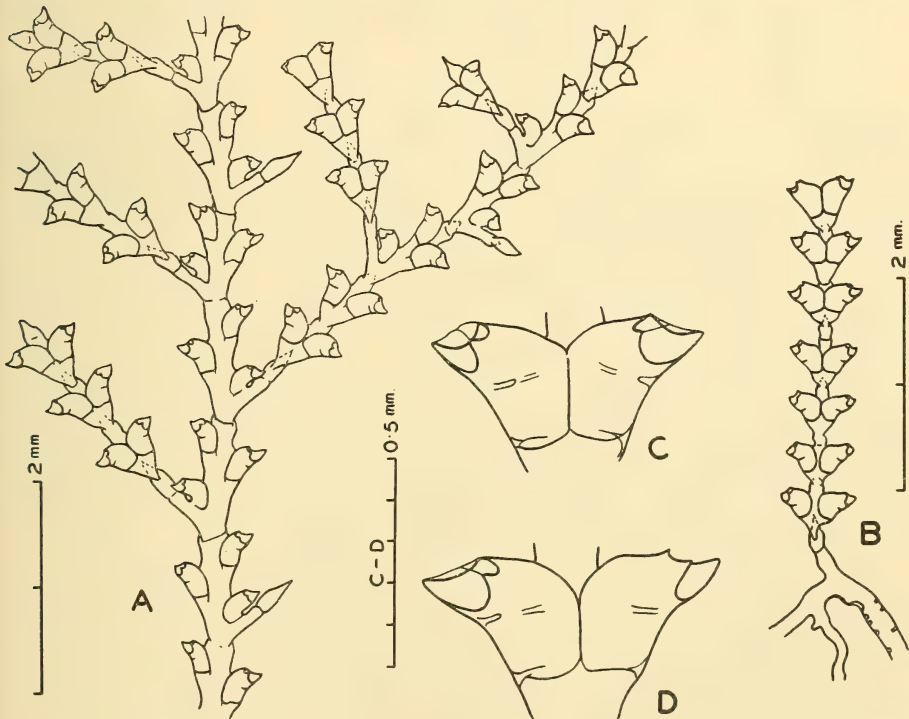


FIG. 13. *Sertularia marginata* (Kirchenpauer), PF 15608 F.

A. Portion of a pinnate stem with hydrocladia and sub-branches. B. A simple stem. C and D. Two pairs of hydrothecae from a hydrocladium.

comparison. Apparently there are two closely related species, *S. amplexans* Allman, and *S. inflata* (Versluys). The description of the latter was not available, while the illustrations of the former are vague and indefinite in the critical features. Totton states that *S. marginata* can be distinguished from *S. amplexans* by the greater length of the basal part of the stem and by the presence of many pairs of hydrothecae below the first hydrocladium. In the False Bay material the length of the basal part of the stem is intermediate between the two species, but closer to *S. amplexans*, yet there are always hydrothecae below the first hydrocladium, usually one pair, but sometimes as many as 4. In every other respect it agrees with *S. marginata*. An unusual feature of the False Bay material is the branching nature of the hydrocladia, which has not previously been described.

### Family: Plumulariidae

#### *Antennella africana* Broch 1914

*Antennella quadriaurita* Ritchie f. *africana* Broch 1914, p. 26.

*Antennella africana* Stechow 1925, p. 492, fig. 41.

*Records.* F 299A (recorded by Eyre 1939). PF 337 B. FB 119 D, 129 B, 131 B. FAL 6 M, 23 M, 26 K, 66 B, 78 K, 169 W, 214 D, 217 M, 230 R, 279 D, 290 B.

*Description.* Clusters of erect, hair-like hydrocladia reaching a maximum height of 2.1 cm. Basal part of hydrocladium consisting of as many as 5 athecate internodes of irregular length, separated by transverse nodes, and terminated by an oblique node. The last of these segments with 2 or 3 nematothecae, sometimes as many as 6, arranged irregularly. Of the others, the shorter ones devoid of nematothecae, the longer ones with 2 or 3.

Remainder of hydrocladium divided into alternate thecate and athecate internodes, bounded distally by transverse and oblique nodes respectively. Oblique nodes very distinct, transverse ones less so and sometimes very faint. Internodes of variable length, generally athecate internodes longer than thecate in lower part of hydrocladium and thecate internodes longer in distal part.

Nematothecae as previously described, 5 on each thecate internode, one on each athecate internode. Occasionally an athecate internode bears 2 median nematothecae, one above the other; and occasionally there are two consecutive athecate internodes each with a median nematotheca.

Gonophores borne on hydrocladia, singly or in pairs, immediately below hydrothecae. Each arises on one side of the hydrocladial protuberance which bears the hydrotheca, about mid-way between the hydrotheca and the median nematotheca. Male and female on separate hydrocladia; or on the same one, the male distal and the female proximal. Present in March, and June to September. Male gonophore elongated, tapering to both ends, distal end closed by a round, deep-convex operculum; one nematotheca on side of lower part; pedicel of 1 segment. Female gonophore larger, broader, truncated at

distal end, closed by a round, shallow-convex operculum; 2 nematothecae on sides of lower part; pedicel of 2 segments.

*Measurements* (mm.)

Hydrocladium, length of basal part	..	..	..	1.02-2.86
thecate internode, length	..	..	..	0.33-0.43
athecate internode, length	..	..	..	0.23-0.52
athecate internode, maximum diameter	..	..	..	0.07-0.13
Hydrotheca, length abcauline	..	..	..	0.19-0.27
diameter at margin	..	..	..	0.21-0.26
Gonotheca, male, length (without pedicel)	..	..	..	0.31-0.54
maximum diameter	..	..	..	0.13-0.23
Gonotheca, female, length (without pedicel)	..	..	..	0.68-0.77
maximum diameter	..	..	..	0.38-0.47

*Remarks.* The gonophores of this species have previously been incorrectly described. In the diagram given by Stechow 1925, the smaller gonophore is male, and the larger female.

The details and measurements of this species are very close to those of *A. serrata* Totton, 1930, from New Zealand, and the latter is possibly a synonym of the former.

*Halopteris constricta* Totton 1930

Fig. 14 A

*Halopteris constricta* Totton 1930, p. 217, fig. 56a.

*Records.* FAL 58 X, 66 G, 78 T.

*Description.* Colonies with both simple and pinnate stems, reaching a maximum height of 9 mm. The simple stems represent hydrocladia arising direct from the hydrorhiza. The structure of the pinnate form resembles that described and figured by Totton, except that the adcauline side of the hydrotheca is usually slightly more concave. The free adcauline part varies from  $\frac{1}{2}$  to  $\frac{1}{4}$  the abcauline length, but is usually in the neighbourhood of  $\frac{1}{3}$ . The basal athecate part of the stem varies in length and may reach 3 mm., and the oblique hinge-joint terminating this region is exactly similar to the other oblique joints of the stem. Additional short athecate internodes devoid of nematothecae may occur below the normal athecate internodes at almost any region of the stem or hydrocladia, one or two are invariably present below the first long athecate internode of the hydrocladium, and sometimes even 3. An extra median nematotheca may occur on the athecate internodes of the hydrocladia (making 2); or on the thecate internodes above the hydrothecae, such internodes being abnormally prolonged in this region. The hydrocladia may have as many as 6 hydrothecae, although the usual number is 2 or 3.

The larger pinnate colonies often have branching hydrocladia, the secondary hydrocladia arising from the primary ones at the sides of the hydrothecae in exactly the same manner as the primary hydrocladia arise from the stem.

There is no regularity in this branching, the secondary hydrocladia arising at any level from the primary, and sometimes 2 secondaries from one primary.

Gonophores not present.

*Measurements* (mm.)

Stem, thecate internode, length	..	..	..	..	0.20-0.32
athecate internode, length	..	..	..	..	0.15-0.42
diameter	..	..	..	..	0.04-0.105
Hydrocladium, first internode, length	..	..	..	..	0.045-0.07
second internode, length	..	..	..	..	0.15-0.28
normal athecate internode, length	..	..	..	..	0.115-0.23
thecate internode, length	..	..	..	..	0.205-0.29
diameter	..	..	..	..	0.035-0.06
Cauline hydrotheca, length abcauline	..	..	..	..	0.14-0.165
length adcauline, free part	..	..	..	..	0.04-0.05
width at mouth	..	..	..	..	0.12-0.16
Hydrocladial hydrotheca, length abcauline	..	..	..	..	0.14-0.16
length adcauline, free part	..	..	..	..	0.04-0.075
width at mouth	..	..	..	..	0.13-0.165
Nematotheca, medial, on athecate internode	..	..	..	..	0.05-0.08
lateral	..	..	..	..	0.055-0.08

*Remarks.* This is the first record of the species from South Africa. The only other recorded locality is New Zealand.

The species appears to be extremely variable in its growth-form, possessing simple stems, pinnate stems, and stems with branching hydrocladia, and variable also in the segmentation of its stem and hydrocladia.

*Halopteris valdiviae* (Stechow) 1923

Fig. 14 B

*Thecocalus* (?) *valdiviae* Stechow 1925, p. 495, figs. 42-43.

*Records.* PF 15608 G.

*Description.* Two unattached plumes, the longer measuring 1.5 cm. Stem unfascicled, but showing the beginning of fasciculation at the base. Basal part of stem without hydrocladia, and in one specimen with several transverse nodes. This part terminated by 2 oblique hinge-joints, between which arises a pair of hydrocladia, one on each side of a cauline hydrotheca. Remainder of stem divided by oblique nodes into regular internodes each bearing one cauline hydrotheca and one hydrocladium.

Hydrocladia alternate, reaching 4 mm., and bearing up to 8 hydrothecae, borne on apophyses of stem internodes alternately on left and right of cauline hydrothecae. Details of hydrocladia exactly as described by Stechow: 1st internode short and without hydrotheca or nematotheca, 2nd internode (and on 1st pair of hydrocladia 3rd internode) longer and with one nematotheca,



remaining internodes thecate. Occasionally the distal end of an internode is cut off by an extra node, but such intermediate internodes are always without nematothecae.

Hydrotheca deeper than wide, adnate for over  $\frac{4}{5}$  of length, margin sinuated. Median nematotheca 2-chambered, short and broad. Median supracalcine nematotheca 1-chambered, reaching hydrotheca margin. Lateral nematothecae 2-chambered, long, not quite reaching the next node. Cauline nematothecae as in Stechow's fig. 43: one short, broad, 2-chambered nematotheca

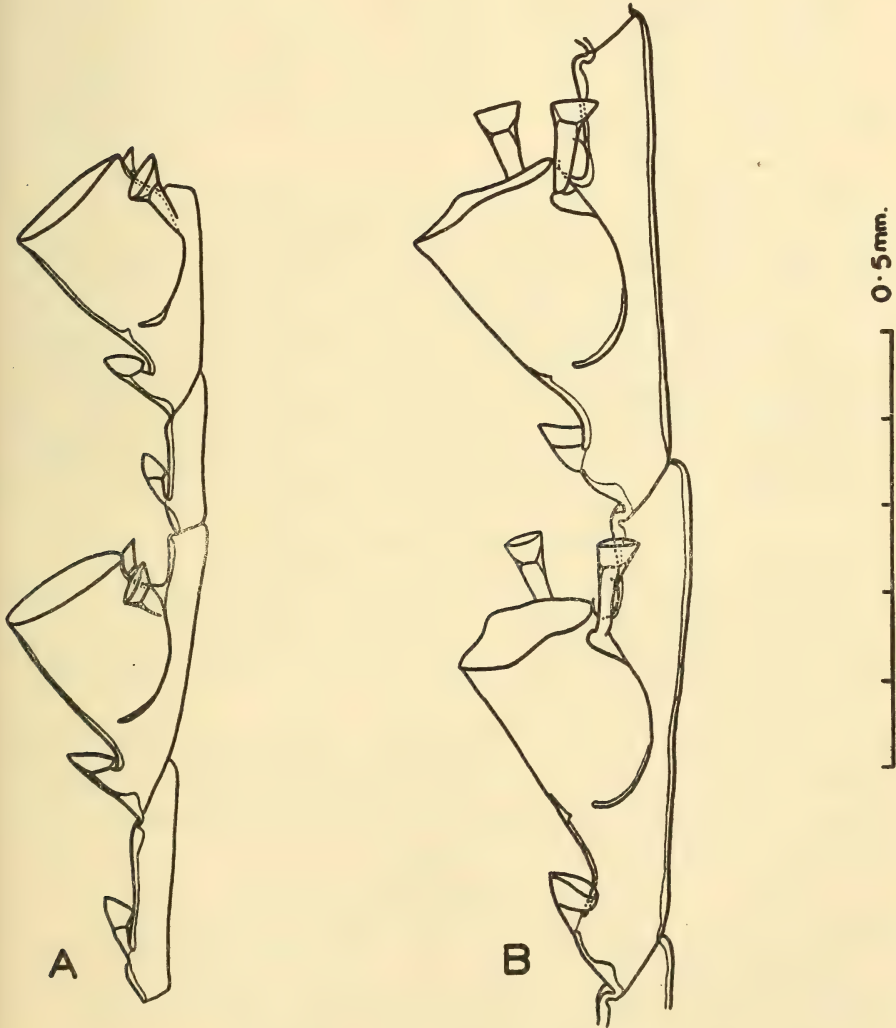


FIG. 14. A. *Halopteris constricta* Totton, FAL 58 X. B. *Halopteris valdiviae* (Stechow), PF 15608 G.

below cauline hydrotheca, and one pair lateral nematothecae, of which that on the opposite side to the hydrocladium is the longer.

Gonophores absent.

*Measurements* (mm.)

Stem, internode length	..	..	..	..	..	0.44-0.50
maximum diameter	..	..	..	..	..	0.14-0.20
Hydrocladium, first internode, length	..	..	..	..	..	0.05-0.09
second internode, length	..	..	..	..	..	0.20-0.27
thecate internode, length	..	..	..	..	..	0.48-0.57
Hydrotheca, length abcauline	..	..	..	..	..	0.18-0.24
length of free part	..	..	..	..	..	0.04
total length/length of free part	..	..	..	..	..	4.50-6.00
diameter at margin	..	..	..	..	..	0.135-0.20
Nematotheca, lateral, length	..	..	..	..	..	0.12-0.17
median, infracalycine, length	..	..	..	..	..	0.07-0.10

*Remarks.* This material agrees so closely with *H. valdiviae* (Stechow 1925, fig. 43) in its detailed structure that it must represent either a young colony or detached branches of the same species. In a heavily fascicled stem such as that described by Stechow the hinge-joints would undoubtedly be obscured. Stechow illustrates the median supracalycine nematotheca as 2-chambered, but describes it as 1-chambered, which it is in the False Bay material. Stechow also states that the lateral nematothecae are as long as the hydrotheca, but the length certainly varies in different parts of the colony as is shown by his own figures, being greater near the base, and less near the tip. The same tendency is shown even in the small fragments from False Bay.

*Paragattya intermedia* Warren 1908

*Paragattya intermedia* Warren 1908, p. 323, fig. 16; Pl. XLVII, fig. 27. Stechow 1923c, p. 234; 1925, p. 494.

*Records.* FAL 52 X (growing on corallines and also on back of crab, *Dehaanius dentatus*), 78 N, 108 M.

*Description.* Numerous colonies, generally growing on Corallines, and reaching a maximum height of 7 mm. The structure agrees exactly with Warren's description, except that the tip of the stem is often prolonged into a swollen tendril-like process which attaches to the substratum and forms a new hydrorhiza. Gonophores present in August.

*Plumularia lagenifera* Allman 1886

*Plumularia lagenifera* Allman 1886, p. 157; Pl. XXVI, figs. 1-3. Nutting 1900, p. 65; Pl. VI, figs. 6-10.

*Plumularia californica* Marktanner-Turneretscher 1890, p. 255; Pl. VI, fig. 4.

*Plumularia lagenifera*, var. *septifera* Ritchie 1909, p. 87, fig. 7.

*Records.* FAL 82 X, 108 L, 123 L, 167 P.

*Description.* Hydrorhiza reticular, growing on weeds and corallines, often with internal chitinous thickenings as described by Ritchie for var. *septifera*.

Stem unbranched, reaching 0.9 cm. Each internode bearing a hydrocladium on a long apophysis just above the centre; containing 2 or 3 septal ridges, with another in the distal end of the apophysis. Occasionally the proximal part of the internode is separated from the rest by an extra node. In some cases the distal end of the stem is broadened and curled over to form a new rooting stock.

Hydrocladia alternate, the two rows forming an angle of about 100° between them, each bearing one short athecate internode (occasionally 2), then alternate thecate and athecate internodes. One septal ridge in proximal internode, 2-4, or occasionally more, in thecate internode, and 1 or 2 in intermediate internode. Occasionally 2 consecutive athecate internodes occur, of which the 1st appears to be the distal end of the previous thecate internode which has been cut off by an extra node.

Hydrotheca borne on pronounced projection from internode, variable in height, but with the lateral and abcauline walls always convex and bending inwards towards mouth. Abcauline wall thickened, sometimes at margin only. Margin not at right angles to internode as figured by Nutting and Allman, but facing slightly away from it as figured by Marktanner-Turneretscher.

Nematothecae: 3 on thecate internode, mesial one borne on swelling of internode below hydrotheca, lateral pair attached below margin of hydrotheca and extending above margin, as figured by Marktanner-Turneretscher and Allman, not as described by Nutting; 1 on intermediate internode; none on proximal hydrocladial internode; 2 or 3 on stem internode, of which one is in the axil of the hydrocladial apophysis and the other(s) on the anterior surface.

Gonothecae borne on apophyses of stem internodes, laterally compressed, ovate in side view with a slender curved neck. In some cases the neck is only slightly curved as figured by Nutting, in others it is bent right over like the neck of a gourd, so that the opening faces downwards and outwards. Truncated forms containing young eggs also present. Present in January, February and June.

*Measurements* (mm.)

Stem internode, length	..	..	..	..	..	0.24-0.38
diameter	..	..	..	..	..	0.075-0.145
Hydrocladium, 1st internode, length	..	..	..	..	..	0.04-0.095
normal athecate internode, length	..	..	..	..	..	0.055-0.13
thecate internode, length	..	..	..	..	..	0.23-0.325
Hydrotheca, length adcauline	..	..	..	..	..	0.08-0.17
length abcauline	..	..	..	..	..	0.06-0.155
diameter at base	..	..	..	..	..	0.055-0.085
diameter in centre	..	..	..	..	..	0.09-0.14
diameter at margin	..	..	..	..	..	0.07-0.12

Nematotheca, length	..	..	..	..	..	0.06-0.075
(an extra large one 0.10)						
Gonotheca length (excluding truncated type)	..	..	..	..	..	0.625-0.91
maximum diameter	..	..	..	..	..	0.26-0.44

*Remarks.* As Bale has remarked, this species is closely related to *P. setacea*, but can be distinguished from it by the fact that the hydrothecal wall (or at least the abcauline side) is convex and narrows towards the mouth. Gonophores with recurved necks have never been observed in *P. setacea*.

The species is very variable and two extremes of form are found. In one the hydrotheca is deep, with the height exceeding the width, and the wall thickened only at the margin. In the other the hydrotheca is shallow, with the width exceeding the height, the entire abcauline wall thickened, and all septal ridges very much accentuated. The latter type corresponds to Torrey's var. *septifera*, described by Ritchie 1909, but since both types may occur in one colony, together with intergrading forms, it does not seem possible to separate them.

*Plumularia pulchella* Bale 1882

*Plumularia pulchella* Bale 1882, p. 30; Pl. XV, fig. 6. Totton 1930, p. 221, fig. 58.

*Plumularia* (*Monothecha*) *flexuosa* Stechow 1925, p. 499.

*Records.* FB 119 E, FAL 13 A, 23 P, 26 J, 66 F, 78 R, 132 X, 153 R, 311 Q.

*Description.* Sparse colonies from various regions of False Bay, reaching a maximum height of 0.7 cm. Stem unbranched or very occasionally with one lateral branch. Hydrocladia arising from apophyses on distal ends of internodes. No gonophores.

*Plumularia setacea* (Ellis and Solander) 1755

*Plumularia setacea* Hincks 1868, p. 296; Pl. LXVI, fig. 1.

*Records.* CP 15 B, 326 G, 327 B, 356 B. FB 131 C. FAL 6 L, 13 F, 15 Y, 66 D, 78 M, 125 T, 137 S, 141 A, 148 G, 153 W, 160 W, 165 Y, 169 Y, 177 M, 217 P, 222 F, 268 G, 274 S, 279 F, 311 P.

*Description.* Numerous colonies reaching a maximum height of 2.2 cm. Gonophores present in February to July, September and December.

*Remarks.* The material from False Bay all falls within Broch's forma *typica*.

*Plumularia spinulosa* Bale 1882, var. *obtusa* Stechow 1923c

*Monothecha spinulosa* var. *obtusa* Stechow 1923c, p. 224.

*Records.* FB 126.

*Description.* Stems reaching 5 mm. in height, and bearing up to 18 hydrocladia. Basal part of stem short, consisting usually of 2 internodes without hydrocladia or nematothecae. Internodal septa well marked, 1 or 2 in each stem internode, 1 in hydrocladial apophysis, 1 in first internode of hydrocladium, 1 or 2 in 2nd internode behind hydrotheca. Hydrocladium arising

from middle or distal end of stem internode. Spine on end of hydrocladium short and bluntly pointed, barely reaching margin of hydrotheca. Gonophores absent.

*Remarks.* Although the typical variety of *P. spinulosa* is known from Natal (Warren 1908), this is the first record of var. *obtusa*. It has previously been recorded from Australia and Japan.

*Kirchenpaueria pinnata* (Linnaeus) 1758

*Plumularia echinulata* Ritchie 1907a, p. 540.

*Plumularia pinnata* Ritchie 1907a, p. 541.

*Plumularia unilateralis* Ritchie 1907a, p. 541; Pl. II, fig. 1.

*Kirchenpaueria pinnata* Broch 1918, p. 53. Vervoort 1946, p. 167, figs. 69-70.

*Records.* F 10, 244 (recorded by Eyre 1939). CP 15 A, 19, 326 A, 356 A, 410 Y. FB 131 D, 140 E, 141 A, 142 B. FAL 42 U, 66 E, 78 L, 108 K, 123 K, 125 U, 160 U, 176 W, 274 P, 288 F.

*Description.* Very common in intertidal region and shallow water, forming a short feathery growth reaching a maximum height of 2.5 cm. Many minor variations occur. In some colonies all the stem internodes bear one hydrocladium each, in others the lower stem internodes may bear as many as 4 hydrocladia. Very occasionally in young colonies hydrocladia may arise separately from the hydrorhiza. On the hydrocladia athecate internodes are occasionally present between 2 thecate ones; and sometimes an extra 1 or 2 athecate internodes may be present between the basal athecate internode and the first thecate one. These may be devoid of nematothecae, or may bear 1 or 2 each.

Gonophores very variable, younger ones normally smooth, older ones ribbed, with or without spines. Borne on stem or on hydrorhiza. Present in February, April to July, and September to October.

*Remarks.* *Kirchenpaueria unilateralis* (Ritchie 1907a) is considered to be a synonym for *K. pinnata*. This conclusion was reached after a careful study of type material kindly loaned by the Royal Scottish Museum, Edinburgh. Its distinguishing features are said to be:

- (i) The stem internodes never bear more than one hydrocladium each. But this is the normal condition in many stems of *K. pinnata*. Further, careful study of the type material of *K. unilateralis* shows that at least two of the stem internodes bear two hydrocladia each.
- (ii) The two rows of hydrocladia are borne on one side of the stem, and so lie in two planes. This unilateral arrangement is obviously only a growth-form of *K. pinnata*, and in False Bay is often found on stems growing in the same colony as the normal flattened type.
- (iii) The hydrocladia occasionally branch. Branching hydrocladia have never again been observed in all the wealth of material examined, neither in the normal flat stems, nor in the unilateral type. If *K. unilateralis* were

retained as a separate species, this would be its only distinguishing feature. I am inclined to regard it, however, as an abnormal condition and possibly due to injury.

In Ritchie's material the internodes of the stem and hydrocladia are rather shorter, and the hydrothecae more crowded than in the False Bay material (hydrotheca length/internode length = 0.40-0.59 mm.), but not sufficiently so for the maintenance of a separate variety. Broch gives the proportions for var. *typica* as  $\frac{1}{3}$  to  $\frac{1}{2}$ . All the False Bay material falls well within the range of var. *typica*.

*Pycnotheca mirabilis* (Allman) 1883

*Diplocheilus mirabilis* Allman 1883, p. 49; Pl. VIII, figs. 4-7.

*Kirchenpaueria mirabilis* Bale 1894.

*Pycnotheca mirabilis* Totton 1930, p. 216, fig. 55.

*Records.* FAL 78 U, 108 J.

*Description.* A fair number of unbranched stems, reaching a maximum height of 3 cm. Basal 2-3 mm. of stem devoid of hydrocladia and containing 1-4 transverse nodes. Remainder with 2 hydrocladia per internode in lower part, and one in distal part.

Gonophores present in January, as described by Bale, borne on hydrorhiza and on basal part of stem replacing hydrocladia.

<i>Measurements</i> (mm.)	<i>False Bay</i>	<i>Richard's Bay</i>
Hydrocladium, internode length .. ..	0.34-0.42	0.32-0.35
Hydrotheca, height .. ..	0.25-0.30	0.20-0.21
diameter at margin .. ..	0.22-0.27	0.18-0.19
adcauline side, length of free part ..	0.08-0.13	0.06-0.08
Gonotheca, length .. ..	2.12-2.88	
maximum diameter .. ..	1.02-1.06	

*Remarks.* The material from False Bay agrees well both in size and structure of the hydrotheca with the typical form of the species as figured by Totton.

In the material previously reported from Richard's Bay, Natal (Millard and Harrison 1954) as *Kirchenpaueria mirabilis*, the hydrothecae are smaller, and the opening into the medial nematotheca is in an oblique position rather than vertical. This material must thus be referred to var. *warreni*. The measurements of the two forms are given for comparison.

*Nemertesia cymodocea* (Busk) 1851

*Antennularia decussata* Kirchenpauer 1876, p. 52; Pl. II, fig. 24; Pl. III, fig. 24; Pl. VII, fig. 24.

*Antennularia hartlaubi* Ritchie 1907a, p. 542; Pl. III, fig. 4.

*Records.* PF 337 A, FB 112, 115 A, 129 A, 131 A, 132, 134 A, 139 A, 146 B, FAL 95 R, 209 F, 211 F, 217 K, 222 E, 268 F, 274 N, 279 C, 290 A.

*Description.* Massive colonies abundant in shallow water and reaching a maximum height of 49 cm. The decussate arrangement, with the hydrocladia borne in alternate pairs, is found in the lower parts of the branches, and the hexastichous arrangement near the ends, i.e. just the opposite of the arrangement described by Marktanner-Turneretscher. In some colonies only the decussate arrangement is present, and in others only the hexastichous type. Occasionally the small branches arising near the base of the colony have only one hydrocladium to an internode, and these are arranged alternately, the two rows being in one plane. One or two athecate internodes may be present at the base of each hydrocladium. The hydrocladium-bearing apophysis bears one pair of bithalamic nematophores, and a 'mamelon' more or less in the centre of the upper surface.

Gonophores include the normal elongated type, and young ones which are shorter and truncated at the ends. Present in February, September and November.

*Nemertesia ramosa* Lamouroux 1816

*Antennularia ramosa* Hincks 1868, p. 282; Pl. LXII.

*Nemertesia ramosa* Broch 1933, p. 38.

*Records.* PF 351 A. FAL 207 G.

*Description.* Two specimens of unbranched fragments with a maximum length of 6.7 cm., some of them fascicled in lower region. Hydrocladia in whorls of 3 in upper parts, but becoming irregular lower down. Hydrocladial apophyses stouter than usually figured, but narrowing to distal ends where the diameter is the same as that of the hydrocladia. Atecate internodes not limited to distal ends of hydrocladia, but irregularly scattered in any region.

One specimen possesses male gonophores and the other female, and these are slightly different in appearance. The young male gonophore is elongated, with a rounded end, and is quite symmetrical. Older ones have open truncated ends which are sometimes at right angles to the stem and sometimes placed slightly oblique, facing towards the stem. Female gonophores always have the opening on the side facing the stem and practically parallel to it. They contain several large eggs or embryos. Both sexes present in September.

*Antennopsis scotiae* Ritchie 1907a

*Antennopsis scotiae* Ritchie 1907 a, p. 543; Pl. III, fig. 3. 1909, p. 90, fig. 8.

*Records.* PF 15675 A. FAL 64 M, 207 H, 211 G, 217 L, 222 G, 230 N, 291 A.

*Description.* Colonies reaching a maximum height of 13.7 cm. Gonophores present in March and September.

*Aglaophenia pluma* (Linnaeus) 1758

*Aglaophenia pluma* Hincks 1868, p. 286; Pl. LXIII, fig. 1. Broch 1933, p. 44.

*General Discussion.* A number of species of *Aglaophenia* have been recorded from South Africa, all closely related to *A. pluma*, namely *A. dichotoma* (M. Sars),

*A. parvula* Bale, *A. conferta* Kirchenpauer, *A. heterodonta* Jäderholm and *A. chalerocarpa* Allman.

Of these *A. parvula*, *A. conferta* and *A. heterodonta* are accepted as synonyms by Ritchie 1909, Bedot 1921 and Stechow 1925. *A. chalerocarpa* is regarded as a synonym for *A. pluma* by Bedot 1921, Stechow 1925 and Vervoort 1946. This leaves three South African species:

- (i) *A. pluma* var. *typica*.
- (ii) *A. dichotoma*.
- (iii) *A. parvula*.

*A. dichotoma* is distinguished from *A. pluma* by its dichotomous branching, and *A. parvula* by the double nature of the second paired tooth of the hydrotheca. However, there is some confusion about this distinction, for Ritchie 1909 includes both dichotomous and unbranched forms under *A. heterodonta*, saying that the minute characters are identical. Leloup 1937a describes a dichotomously branched form with the double hydrothecal tooth as *A. parvula* but suggests that the latter may be a variety of *A. dichotoma*. Bedot 1921 suggests that *A. parvula* is a variety of *A. pluma*.

Examination of a large series of specimens in the University collection suggests that the three forms should be regarded as varieties of the same species, for neither of the distinguishing features is clear-cut and there are many intermediate types. The 'parvula' form can, and does, branch dichotomously, although its stems generally form a short, dense turf in shallow water and intertidal regions. The 'dichotoma' form, with its long-drawn-out, dichotomously branched stems is more typical of deeper water and occurs abundantly in dredgings round the coast. But all intermediate stages occur.

The double point of the second hydrothecal tooth is most pronounced in the 'parvula' form (fig. 15), but by no means constant, the second point may be only a hump on the side of the tooth, or the tooth may be single-pointed and triangular. All variations may occur in the same colony, but in general the second point is better developed in the lower parts of the hydrocladia. A similar variation occurs in the 'dichotoma' form, where the second hydrothecal tooth is usually triangular, but may have an accessory point on one side. Only seldom does the 'pluma' type occur, where there is no sign of a double-pointed tooth.

The corbulae are sexually dimorphic and are identical in all three forms. Nor could any difference, other than minor variations in length and breadth, be found in the internodes of the stem or hydrocladia. The length of the median nematotheca is variable in each form, but in general is longer in the 'parvula' form than in the 'pluma' and 'dichotoma' forms.

For convenience a brief description of the composite species as now envisaged follows.

*Description.* Stem unfascicled, branched or unbranched, distinctly segmented. The basal part of the stem, which is of variable length and often very short, is



devoid of hydrocladia and nematothecae, and divided into internodes of irregular length by transverse nodes. This region is terminated by 2 oblique hinge-joints (occasionally 3) with one extra large nematotheca between them. The rest of the stem is divided by slightly oblique nodes into regular internodes each bearing a hydrocladium. The first internode of this region is longer than the others and bears 2 hydrocladia.

The stem may branch in two ways, and both types may be present in the same colony:

- (i) The hydrocladia-bearing part may divide dichotomously, the two branches being of equal diameter and arising from apophyses on a broad stem internode, which also bears a hydrocladium. The internodes of the branches all bear hydrocladia.
- (ii) Subsidiary branches may be given off from the stem; these are always short and usually of smaller diameter. They do not arise dichotomously, but replace hydrocladia. On these branches the first few internodes are without hydrocladia, then follow 2 oblique hinge-joints and then hydrocladia-bearing internodes, exactly as on the base of the stem.

Hydrocladia alternately arranged, with the two rows directed towards one side of stem, divided into internodes by transverse or slightly oblique nodes. Each internode with 2 internodal septa and 1 hydrotheca.

Hydrotheca with 9 marginal teeth, including 1 median tooth on abcauline side directed inwards, and 4 pairs of lateral teeth, of which the second may be double.

Median nematotheca narrow at base, but widening distally, adnate for most of length and then free, reaching to hydrothecal margin or just below. Openings 2 (1 into hydrotheca, 1 extending along free adcauline edge on to distal end) or 3 (1 into hydrotheca, 1 on adcauline surface at base of free part, 1 on distal end). Supracalycine nematothecae swollen, reaching to hydrothecal margin or just below. Cauline nematothecae 4, of which one is on hydrocladial apophysis.

Corbula replacing hydrocladium, with one hydrotheca between it and stem. Female corbula closed, except for first rib, with 4-9 ribs on each side, each with about 10 nematothecae along one edge. First rib free at base, bearing about 6 nematothecae on each edge, and a free lateral branch on one side running parallel to the axis of the corbula and bearing about 6 nematothecae on each edge. The side of the free branch corresponds to the side of the corbula, i.e. when the corbula replaces a right-hand hydrocladium the free branch is on its right. Very occasionally female corbulae may lack the free lateral branch, though present in others of the same colony.

Male corbula partly or completely open, with 5-9 ribs on each side. Ribs usually fused in basal part (except for first rib which is free), and bearing nematothecae along one edge, free in distal part and bearing nematothecae along both edges. Old empty corbulae often with ribs free for entire length.

Normally no lateral branch on first rib, but very occasionally a small stunted one present. Male and female corbulae on separate stems.

var. *typica* Bedot 1919

Fig. 15 A

?*Aglaophenia chalerocarpa* Allman 1886, p. 150; P. XXI, figs. 1-4.

*Aglaophenia pluma* forma *typica* Broch 1933, p. 44, fig. 18a.

*Aglaophenia pluma* Vervoort 1946a, p. 335, fig. 8.

Records. FB 133 A. FAL 13 C, 20 R, 26 H.

*Description.* Stems short, usually about 5 cm., generally unbranched. Second paired tooth of hydrotheca triangular or truncated, but not double. Median nematotheca not reaching to hydrothecal margin. Stems dark brown, hydrocladia lighter. Ripe corbulae in March.

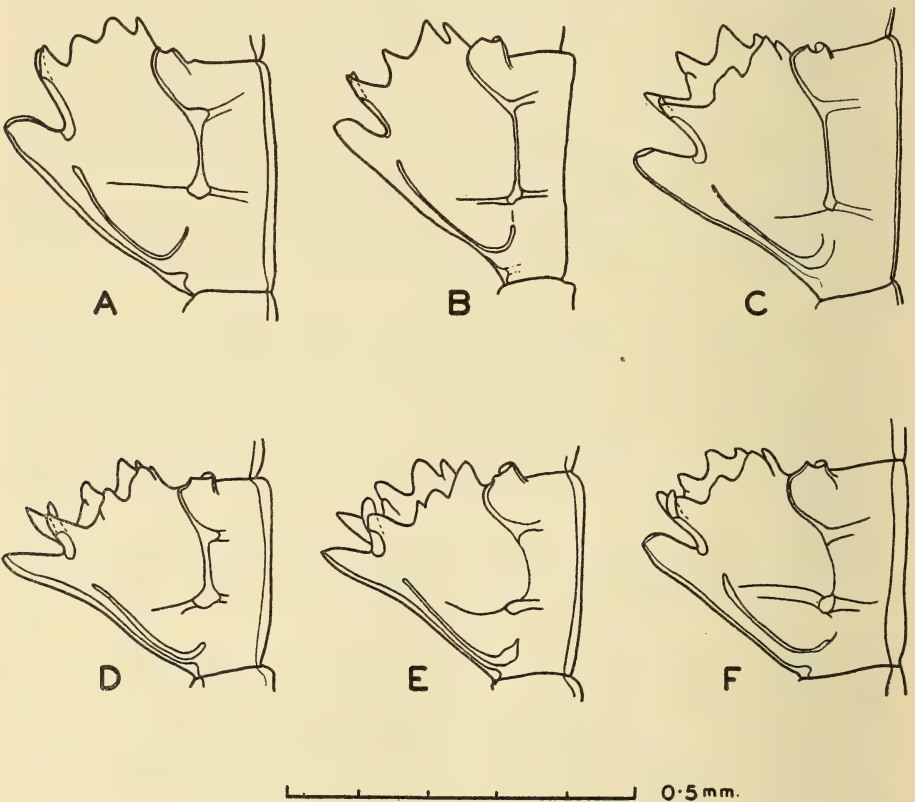


FIG. 15. *Aglaophenia pluma* (Linnaeus).

A. var. *typica* Bedot, FB 133 A. B and C. var. *dichotoma* (M. Sars), FB 116. In B the second paired tooth is single and triangular, in C it has a subsidiary point. D and E. var. *parvula* Bale (not from False Bay material). Second paired tooth bifid. F. var. *parvula* Bale, FAL 62 L. Subsidiary point of second paired tooth almost obsolete.

*Measurements* (mm.)

Stem internode, length	..	..	..	..	..	0·38-0·41
Hydrocladial internode, length	..	..	..	..	..	0·28-0·33
Hydrotheca, length	..	..	..	..	..	0·27-0·34
length above median nematotheca	..	..	..	..	..	0·09-0·12
width at margin	..	..	..	..	..	0·17-0·21

*Remarks.* Allman's specimens of *A. chalerocarpa* should probably be included here.

var. *dichotoma* (M. Sars) 1857

Fig. 15 B and C

*Aglaophenia pluma* var.  $\beta$  Hincks 1868, p. 287.

*Aglaophenia dichotoma* Kirchenpauer 1872, p. 30; Pl. I, fig. 7; Pl. II, fig. 7; Pl. III, fig. 7. Ritchie 1907a, p. 539; Pl. III, fig. 2. Vervoort 1946a, p. 338.

*Aglaophenia tubiformis* Marktanner-Turneretscher 1890, p. 269; Pl. VII, figs. 4, 5, 17.

*Aglaophenia heterodonta* Ritchie 1909 (pp.), p. 96.*Aglaophenia dichotoma* f. *typica* Broch 1933, p. 54, fig. 18b.

*Records.* CP 326 C. FB 110, 111, 116, 117, 120 A, 121 A, 127, 128, 146 A, 147 A. FAL 209 E, 217 J.

*Description.* Stems elongated and branching profusely in a dichotomous manner, though diameter remains the same; often reaching 20-30 cm. in length. Second paired tooth of hydrotheca usually single-pointed and triangular, but often with a subsidiary point on one side. Median nematotheca not reaching hydrothecal margin. Colour somewhat lighter than var. *typica*, with hydrocladia cream. Ripe corbulae in February, September and November.

*Measurements* (mm.)

Stem internode, length	..	..	..	..	..	0·37-0·50
Hydrocladial internode, length	..	..	..	..	..	0·29-0·37
Hydrotheca, length	..	..	..	..	..	0·29-0·35
length above median nematotheca	..	..	..	..	..	0·09-0·11
width at margin	..	..	..	..	..	0·18-0·25
Corbula, male, length	..	..	..	..	..	1·99-3·53
width	..	..	..	..	..	0·84-1·25
Corbula, female, length	..	..	..	..	..	2·43-3·02
width	..	..	..	..	..	1·02-2·28

var. *parvula* Bale 1882

Fig. 15, D-F

?*Aglaophenia conferta* Kirchenpauer 1872, p. 32; Pl. I, fig. 4; Pl. II, fig. 4; Pl. III, fig. 4.

*Aglaophenia parvula* Bale 1882, p. 23; Pl. XIV, fig. 3. 1884, p. 165; Pl. XIV, fig. 3; Pl. XVII, fig. 10. Stechow 1925, p. 516. Vervoort 1946a, p. 339, fig. 9b.

*Aglaophenia heterodonta* Jäderholm 1903, p. 296; Pl. XIII, figs. 10-12; Pl. XIV, fig. 1. Ritchie 1909 (pp.), p. 96.

*Records.* F 49, 253 (reported by Eyre 1939 as *A. dichotoma*). CP 18, 356 D, 392 P, 410 X, 415 X. FB 119 A, 130. FAL 62 L, 66 C, 78 Q, 125 V, 160 T, 176 X, 262 A, 279 G.

*Description.* Stems short and clustered, usually unbranched, but sometimes branching by either of the methods described above, seldom more than one branch to a stem. Length usually 3-5 cm., maximum length recorded 11.6 cm. Second paired tooth of hydrotheca usually double, though sometimes one point is much smaller than the other, and occasionally the tooth is single-pointed and triangular. Median nematotheca usually reaching hydrothecal margin. Colour darker than var. *dichotoma* and more like var. *typica*. Ripe corbulae in February, and April to September.

*Measurements* (mm.)

Stem internode, length	..	..	..	..	..	0.26-0.55
Hydrocladial internode, length	..	..	..	..	..	0.25-0.29
Hydrotheca, length	..	..	..	..	..	0.25-0.31
length above median nematotheca	..	..	..	..	..	0.06-0.10
width at margin	..	..	..	..	..	0.17-0.22
Corbula, male, length	..	..	..	..	..	1.97-2.75
width	..	..	..	..	..	0.96-1.07
Corbula, female, length	..	..	..	..	..	1.69-1.98
width	..	..	..	..	..	1.00-1.05

*Thecocarpus giardi* Billard 1907

*Thecocarpus Giardi* Billard 1907, p. 381, fig. 21; Pl. XXV, fig. 9; Pl. XXVI, figs. 11-16.

*Thecocarpus giardi* Vervoort 1946a, p. 335.

*Records.* PF 396 A.

*Description.* Colony reaching 23.8 cm. in height. Basal part of stem thick and woody with a maximum diameter of 15 mm., and branching irregularly. At about 12-15 cm. from the base each branch assumes the spirally twisted form described by Billard and gives off alternate pinnae which bear the hydrocladia.

Hydrocladial internodes with two well-developed internodal septa, the lower one continued as an intrathecal septum across the hydrotheca about a third from its base, the upper one opposite the base of the lateral nematotheca.

The lateral hydrothecal teeth are seldom bifurcated as in many of Billard's specimens, with the exception of the pair nearest the hydrocladium which is

invariably double, so that one could more accurately describe the hydrotheca as having 4 pairs of lateral teeth, and 1 median tooth of variable length.

Corbulae as described by Billard, present in October.

*Lytocarpus filamentosus* (Lamarck) 1816

*Lytocarpus filamentosus* Billard 1907, p. 371; figs. 15-17.

*Halicornaria segmentata* Warren 1908, p. 328; Pl. XLVIII, figs. 33-36.

Records. CP 224. PF 18293 A. FAL 13 B, 42 V, 52 W, 58 W, 66 A, 78 P.

Description. Colonies reaching a maximum height of 9.9 cm. The gonocladium varies in length, possessing only 3 or 4 segments to the nematocladium in some specimens and as many as 10 in others. Gonophores present in October and December.

Measurements (mm.)

Hydrocladial internode, length	..	..	..	..	0.22-0.26
Hydrotheca, length, to tip of median tooth	..	..	..	..	0.25-0.28
width at margin	..	..	..	..	0.11-0.16
Median nematotheca, length abcauline	..	..	..	..	0.24-0.30
length adcauline, free part	..	..	..	..	0.08-0.14

REFERENCES

- Allman, G. J., 1876. 'Diagnoses of new genera and species of Hydroida.' *J. Linn. Soc. Lond. (Zool.)*, vol. XII, pp. 251-284.
- Allman, G. J., 1883. 'Report on the Hydroida dredged by H.M.S. *Challenger* during the years 1873-76. Part I. Plumularidae.' *Rep. Sci. Res. H.M.S. Challenger, Zool.*, vol. VII, pp. 1-54.
- Allman, G. J., 1886. 'Description of Australian, Cape and other Hydroida, mostly new, from the collection of Miss H. Gatty.' *J. Linn. Soc. Lond., Zool.*, vol. XIX, pp. 132-161.
- Allman, G. J., 1888. 'Report on the Hydroida dredged by H.M.S. *Challenger* during the years 1873-76. Part II. The Tubularinae, Corymorphinae, Campanularinae, Sertularinae and Thalamophora.' *Rep. Sci. Res. H.M.S. Challenger, Zool.*, vol. XXIII, pp. 1-87.
- Bale, W. M., 1882. 'On the Hydroida of South-Eastern Australia, with descriptions of supposed new species, and notes on the genus *Aglaophenia*.' *J. Micr. Soc. Victoria*, vol. II, pp. 15-48.
- Bale, W. M., 1884. 'Catalogue of the Australian Hydroid Zoophytes.' Austr. Mus. Sydney, pp. 1-198.
- Bale, W. M., 1888. 'On some new and rare Hydroida in the Australian Museum Collection.' *Proc. Linn. Soc. N.S. Wales*, ser. 2, vol. III, pp. 745-799.
- Bale, W. M., 1894. 'Further notes on Australian Hydroids, with descriptions of some new species.' *Proc. Roy. Soc. Victoria (n.s.)*, vol. VI, pp. 93-117.
- Bale, W. M., 1913. 'Further notes on Australian Hydroids. II.' *Proc. Roy. Soc. Victoria (n.s.)*, vol. XXVI, pp. 114-147.
- Bale, W. M., 1914. 'Report on the Hydroida collected in the Great Australian Bight and other Localities. Part I.' *Biol. Res. 'Endeavour'*, 1909-1914, vol. II, pp. 3-62.
- Bale, W. M., 1915. 'Report on the Hydroida collected in the Great Australian Bight and other Localities. Part III.' *Biol. Res. 'Endeavour'*, 1909-1914, vol. III, pp. 241-336.
- Bale, W. M., 1924. 'Report on some Hydroids from the New Zealand coast, with notes on New Zealand Hydroida generally, supplementing Farquhar's list.' *Trans. Proc. N.Z. Instit.* vol. LV, pp. 225-268.
- Bedot, M., 1921. 'Notes systématiques sur les Plumularides.' *Rev. Suisse Zool.*, vol. 28, pp. 311-356.
- Billard, A., 1906b. 'Hydroïdes.' *Expéd. Sci. 'Travailleur' et du 'Talisman'*, vol. VIII, pp. 153-241.
- Billard, A., 1907. 'Hydroïdes de Madagascar et du Sud-Est de l'Afrique.' *Arch. Zool. exp. gén.*, ser. 4, vol. VII, pp. 335-396.

- Billard, A., 1925. 'Les Hydroïdes de l'expédition du Siboga. II. Synthecidae et Sertularidae.' *Siboga-Expeditie*, monogr. VII b, pp. 1-116.
- Broch, H., 1914. 'Hydrozoa benthonica.' *Michaelsen's Beiträge zur Kenntnis der Meeresfauna Westafrikas*, vol. I, pp. 19-50.
- Broch, H., 1918. 'Hydroïda II.' *Danish Ingolf Exped.*, vol. V, pp. 1-205.
- Broch, H., 1933. 'Zur Kenntnis der adriatischen Hydroïdenfauna von Split.' *Norske Videns.-Akad. Oslo, I. Mat.-Naturv. Klasse*, no. 4, pp. 1-115.
- Eyre, J., 1939. 'The South African Intertidal Zone and its relation to Ocean Currents. VII. An Area in False Bay.' *Ann. Natal Mus.*, vol. IX, pp. 283-306.
- Fraser, C. McL., 1944. 'Hydroïds of the Atlantic Coast of North America.' Toronto.
- Hartlaub, C., 1905. 'Die Hydroïden der magalhaensischen Region und chilenischen Küste.' *Fauna Chilensis*, vol. III, pp. 497-714.
- Hincks, T., 1868. 'A History of the British Hydroid Zoophytes.' London.
- Jäderholm, E., 1903. 'Aussereuropäische Hydroïden im schwedischen Reichsmuseum.' *Ark. Zool.*, vol. I, pp. 259-312.
- Jäderholm, E., 1904. 'Hydroïden aus den Küsten von Chile.' *Ark. Zool.*, vol. II, pp. 1-7.
- Kirchenpauer, G. H., 1872. 'Ueber die Hydroïdenfamilie Plumularidae, einzelne Grupp derselben und ihre Fruchthälter, I. Aglaophenia.' *Abh. Naturw., Hamburg*, vol. V, pp. 1-52.
- Kirchenpauer, G. H., 1876. 'Ueber die Hydroïdenfamilie Plumularidae, einzelne Gruppen derselben und ihre Fruchthälter, II. Plumularia und Nemertesia.' *Abh. Naturw. Hamburg*, vol. VI, pp. 1-59.
- Leloup, E., 1935. 'Hydrides Calyptoblastiques des Indes Occidentales.' *Mém. Mus. Roy. d'Hist. Nat. Belgique*, ser. 2, fasc. 2, pp. 1-73.
- Leloup, E., 1937a. 'Résultats Scientifiques des Croisières du Navire-École Belge "Mercator". Hydroïdea, Siphonophora, Ceriantaria: Hydropolypes.' *Mém. Mus. Roy. d'Hist. Nat. Belgique*, ser. 2, fasc. 9, pp. 91-121.
- Manton, S. M., 1940. 'On two new species of the Hydroid *Myriothele*.' *Sci. Rep. Brit. Graham Land Exped. 1934-1937*, vol. I, pp. 255-294.
- Marktanner-Turneretscher, G., 1890. 'Die Hydroïden des k.k. naturhistorischen Hofmuseums.' *Ann. k.k. naturh. Hofmus.*, vol. V, pp. 195-286.
- Millard, N. A. H. and Harrison, A. D., 1954. 'The Ecology of South African Estuaries. Part V: Richard's Bay.' *Trans. Roy. Soc. S. Afr.*, vol. XXXIV, pp. 157-179.
- Millard, N. A. H., 1955. 'New species of Hydrozoa from South Africa.' *Ann. S. Afr. Mus.*, vol. XLI, pp. 215-222.
- Nutting, C. C., 1900. 'American Hydroïds. Part I. The Plumularidae.' *Spec. Bull. Smithsonian Inst., Washington*, No. IV, pp. 1-285.
- Rees, W. J., 1938. 'Observations on British and Norwegian Hydroïds and their Medusae.' *J. Mar. Biol. Ass. U.K.*, vol. XXIII, pp. 1-42.
- Rees, W. J., 1946. 'A Revision of the Hydroid Genus *Perigonimus* M. Sars, 1846.' *Bull. Brit. Mus. (Nat. Hist.)*, *Zool.*, vol. III, pp. 337-362.
- Ritchie, J., 1907. 'On Collections of the Cape Verde Islands Marine Fauna, made by Cyril Crossland, M.A. (Cantab.) B.Sc. (Lond.), F.Z.S., of St. Andrews University, July to September, 1904.' *Proc. Zool. Soc. Lond.*, pp. 488-514.
- Ritchie, J., 1907a. 'The Hydroïds of the Scottish National Antarctic Expedition.' *Trans. Roy. Soc. Edinburgh*, vol. XLV, pp. 519-545.
- Ritchie, J., 1909. 'Supplementary Report on the Hydroïds of the Scottish National Antarctic Expedition.' *Trans. Roy. Soc. Edinburgh*, vol. XLVII, pp. 65-101.
- Ritchie, J., 1911. 'Hydrozoa (Hydroid Zoophytes and Stylasterina) of the 'Thetis' Expedition.' *Mem. Austr. Mus. Sydney*, vol. IV, pp. 807-869.
- Stechow, E., 1913a. 'Hydroïdpolypen der japanischen Ostküste. Teil II.' *Abh. Bayer. Akad. Wiss., Math.-phys. Kl.*, suppl. vol. III, pp. 1-162.
- Stechow, E., 1919a. 'Zur Kenntnis der Hydroïdenfauna des Mittelmeeres, Amerikas und anderer Gebiete.' *Zool. Jahrb. Jena*, vol. XLII, pp. 1-172.
- Stechow, E., 1923b. 'Ueber Hydroïden der Deutschen Tiefsee-Expedition, nebst Bemerkungen über einige andre Formen.' *Zool. Anz. Leipzig.*, vol. LVI, pp. 97-119.
- Stechow, E., 1923c. 'Zur Kenntnis der Hydroïdenfauna des Mittelmeeres, Amerikas und anderer Gebiete. II Teil.' *Zool. Jahrb. Jena*, vol. XLVII, pp. 29-270.

- Stechow, E., 1925. 'Hydroiden der Deutschen Tiefsee-Expedition.' *Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer 'Valdivia' 1898-1899*, vol. XVII, pp. 383-546.
- Stechow, E., 1932. 'Neue Hydroiden aus dem Mittelmeer und dem Pazifischen Ozean, nebst Bemerkungen über einige wenig bekannte Formen.' *Zool. Anz. Leipzig.*, vol. C, pp. 81-92.
- Totton, A. K., 1930. 'Coelenterata. Part V.—Hydroida.' *Brit. Antarct. ('Terra Nova') Expedition 1910. Nat. Hist. Rep., Zool.*, vol. V, pp. 131-252.
- Trebilcock, R. E., 1928. 'Notes on New Zealand Hydroida.' *Proc. Roy. Soc. Victoria (n.s.)*, vol. XLI, pp. 1-31.
- Vanhöffen, E., 1910. 'Die Hydroiden der Deutschen Südpolar-Expedition, 1901-1903.' *Deutschen Südpolar-Exped. 1901-1903*, vol. XI, Zool., pp. 269-340.
- Vervoort, W., 1946. 'Fauna van Nederland. Vol. XIV. Hydrozoa (C 1), A. Hydropolypen.' Leiden.
- Vervoort, W., 1946a. 'Exotic Hydroids in the Collections of the Rijksmuseum van Natuurlijke Historie and the Zoological Museum at Amsterdam.' *Zool. Meded.*, vol. XXVI, pp. 287-351.
- Vervoort, W., 1946b. 'Hydroiden uit de Waddenzee.' *Arch. Néerl. Zool.*, vol. VII, pp. 334-352.
- Warren, E., 1906a. 'On *Tubularia solitaria* sp. n., a Hydroid from the Natal Coast.' *Ann. Natal Mus.*, vol. I, pp. 83-96.
- Warren, E., 1908. 'On a Collection of Hydroids, mostly from the Natal Coast.' *Ann. Natal Mus.*, vol. I, pp. 269-355.
- Warren, E., 1909. 'On *Lafoea dispolians* sp. n., a Hydroid parasitic on *Sertularia bidens*, Bale.' *Ann. Natal Mus.*, vol. II, pp. 105-112.